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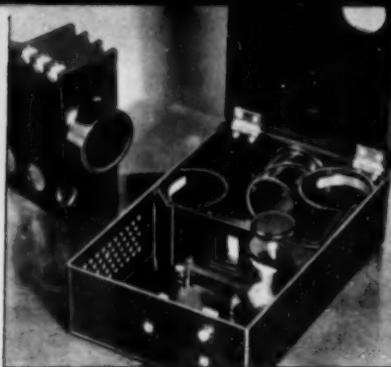
MODERN • PLASTICS



••••• JANUARY 1935 •••••



DURABLE: The Ediphone mouthpiece and switch housing must be light in weight and must withstand the roughest knocks. The Durez part with permanent finish will last the life of machine.



LIGHT: Lightness is a relative term. Used in connection with this Durez pocket projector it is coupled with strength . . . Durez weighs but a fraction of steel, zinc, aluminum.



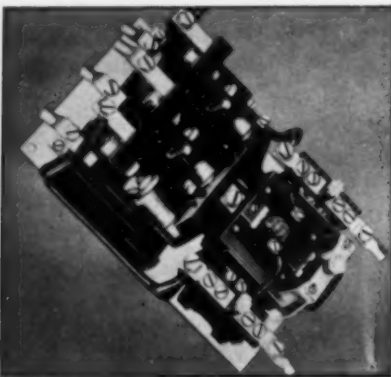
STRONG: No matter how many thousands of times a day heavy hands pound this Bates machine, the Durez frame will stand up—year after year!



DENT PROOF: Your soda-jerker handle of heavy ice-cream scoops but they don't dent this molded Durez.



PRECISION AND INSULATION: The scaled panel must register the recordings of the Davis-Bovie Diathermy machine. The plug-in panel must be high in dielectric strength to resist high voltages. Durez is used for both reasons.



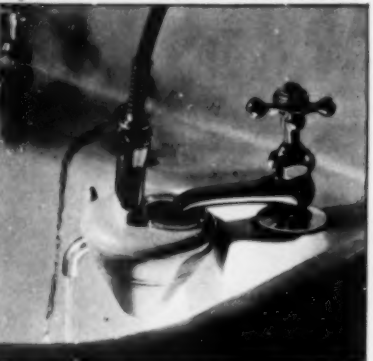
INTRICATE SHAPES: The switch base produced by Allen-Bradley is an intricate bit of molding . . . lugs, bushings and inserts are molded into the piece in one operation. The high dielectric strength of Durez makes other insulation unnecessary.



PROTECTION: This sturdy Durez pocket case is practically immune to breakage. It's proof against grease and moisture, too, and will keep the delicate micrometer which it contains out of harm's way.



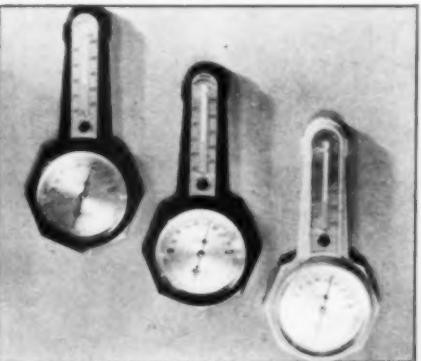
CORROSION PROOF: Submerged in a water closet . . . what a test! float balls live through it. Chemicals in the water, which corroded formerly used, have no effect on Durez.



HEAT PROOF: The Durez molded parts in this Heater are continually subjected to furiously boiling water, but they do not disintegrate.



DIELECTRIC: Arcing paths caused by grease and moisture prove unavailing against this Mallory Ignition Coil, for its case is molded of Durez.



COLOR VARIETY: Color in Durez is not surface finish . . . like lacquer or paint . . . it goes all the way through the piece. Durez color does not dull, chip or peel . . . many colors available.



SMOOTH SURFACE! Durez' surface is pleasant to touch. As Durez conducts heat slowly, fingers burned when they touch this Durez.



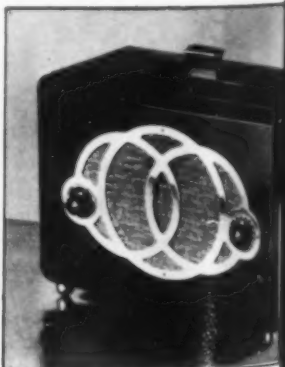
PEEL-PROOF: No bare metal spots where enamel has peeled off on these typewriter parts. They're molded of Durez . . . and can't chip, peel or dent.



CHEMICALLY INERT: Continual contact with the alcohol solution inside this sanitizer will not affect Durez. This material is likewise inert to 10% solutions of acetic or hydrochloric acids.



NEEDS NO POLISHING: Take a Durez job out of the mold . . . and it's both made and polished. For polish and luster are automatically produced in the mold.



PERMANENT LUSTER: Luster is part of every Durez molding . . . usage cannot dull or efface it.

DUREZ

THE MODERN MOLDING COMPOUND

DUREZ Invites Correspondence from manufacturers of electrical devices, thermometers, motor-car parts, novelties, office equipment and machines, optical goods and scientific instruments, store equipment, sporting goods,

notions and others. There is no obligation, just write us—tell us what you need, what your problems are—and we'll help you in every way we can. General Plant, 400 Walck Road, North Tonawanda, Pa.



VOLUME TWELVE

NUMBER FIVE

JANUARY 1935

MODERN PLASTICS

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JANUARY, 1935

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Plastics by RICHARDSON

How a RICHARDSON PRODUCT Aided in Giving an Up-to-date Streamline To the Pioneer Figure-Writing Check Writer

RICHELAIN...

A line of more than thirty quality products, consisting of Alice in Wonderland play-proof shatterless tea sets, cereal bowls, mugs, novelty dishes, and countless others . . . because of attractive colors, lightness for mailing purposes, Richelain is an outstanding material for fabrication of premium items.

INSUROK...

(A superior laminated phenolic product) in sheets, rods, tubes and fabricated parts in several grades for different applications.

EBROK...

An acid resisting bituminous plastic developed by Richardson research for specific requirements. . . . Used in molding more than 50 million battery containers. A record of achievement in the plastic art never equalled.

RUBTEX...

Molded hard rubber for all purposes.

. . . A quartet of worthy products produced by the largest organization devoted exclusively to the plastic arts in the United States with three modern plants at strategic locations.

With the modern urge to streamline industrial products, The Hedman Manufacturing Company again decided to pioneer. Mechanically its machines were correct but modernization of design was the order of the day. The new F & E Lightning Check Writer, restyled in striking streamline fashion, leads its field in the modern trend.

Eight RICHELAIN numeral selector bars in ivory and ebony tint give this new F & E machine its modern keynote of beauty, efficiency and durability.

Internally they are slotted cleverly with the inner mechanism of the machine assuring that homogeneity of material and function so necessary in any efficient office device.

As custom molders of Plaskon, Beetle, Durez, Bakelite, Resinox and all forms of synthetic resin plastics, the vast resources of our Research Laboratories, Design and Engineering Departments are at your command.

The **RICHARDSON COMPANY**
Melrose Park, Ill. Cincinnati, Ohio New Brunswick, N. J. Indianapolis, Ind.



MODERN PLASTICS

BRESKIN AND CHARLTON PUBLISHING CORP.
JANUARY, 1935 VOL. 12, No. 5

WHAT PLASTIC MOLDING INVOLVES

SO much has been said about the low cost of molded plastics and about the facility with which such articles are made that those who purchase these products for the first time are sometimes startled to learn just what particular items are involved when quantity manufacture is undertaken. True, many items can be made from plastics more economically than they can be produced in any other form. In other instances, plastics offer the only feasible answer to the requirements of a particular design. On the other hand, experienced purchasers, who have gained an insight into the things involved in plastic molding, may well wonder how, under the circumstances, prices are kept within reasonable bounds.

What, then, is necessary for a molding plant before it can hope to produce economically, day in and day out, products which must meet rather exacting requirements? Quite aside from the matter of equipment there must be, for best and consistent results, long experience in mold design and in molding, a good knowledge of the large number and grades of materials available, and a keen appreciation of the limitations which must be observed if the product is to come within the feasible price range.

It is difficult to make the layman see sometimes how important it is that the organization be an experienced one if troubles, delays and needless expense in molding are to be avoided. It does not require a very large investment to set up a few presses and a little supplementary equipment and declare that you are in the molding business, but it is quite another matter to operate this equipment efficiently and to maintain an organization

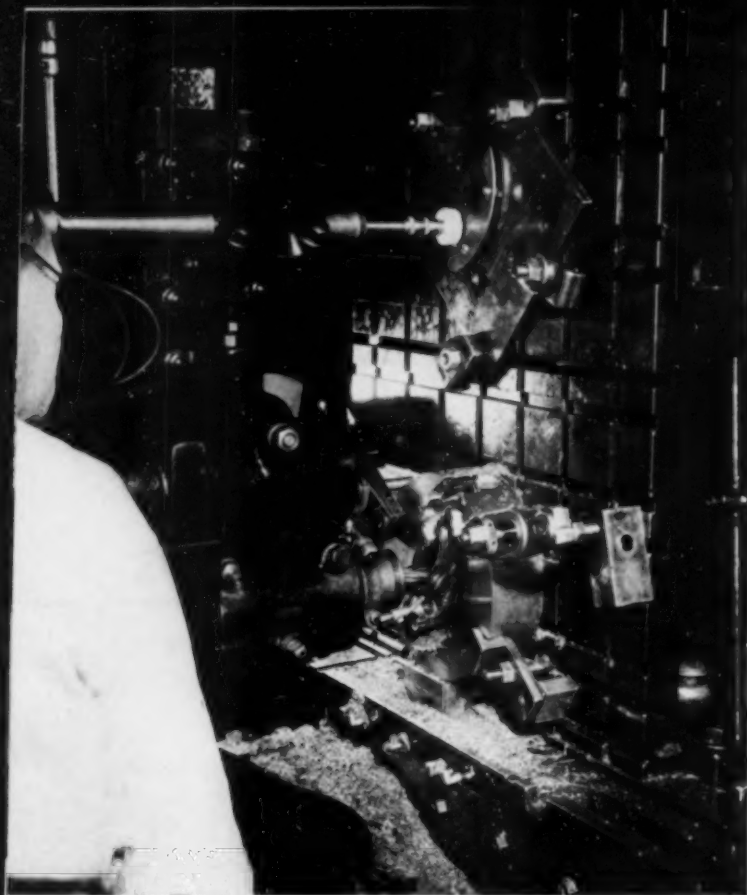
with such experience that it can handle the countless problems that constantly beset even a well organized molding plant.

There appears to be no such thing as "standard" practice in molding. Every new product and each type of material presents certain problems which somebody must solve. Even the most experienced molder encounters these problems daily, but his experience enables him to meet and solve them quickly as a rule, whereas a small shop can rarely command the services of men with the experience required and is likely to keep the customer waiting while experiment proceeds a solution of the problem.

Experience starts with the design of the piece and of the mold in which it is to be made. If either is at fault, months may pass before the trouble is overcome. A recent experience will make this clear: A certain cosmetic manufacturer wanted a particular product made to a particular design which he had had developed. He took it to a molder of long experience who pointed out its faults and suggested some simple changes in design which would make it feasible from a molding standpoint. But nothing would be conceded. The design was one that could be molded but involved expensive

The personnel of a molding plant must be skilled, with a background of years of experience. Here is a typical scene when engineers get together to discuss the molding of a new part. Courtesy—General Electric Co.





The manufacture of molds requires considerable high-grade machine tool equipment and expert handling. Here is a typical operation. Courtesy—General Electric Company

molds, and so many difficulties in molding that no reasonable sort of production rate could possibly be maintained. Nevertheless, the customer persisted in his determination to have the product made as designed, and, though warned of the cost, agreed to meet it. The molder did his utmost but in three months had produced only a few thousand acceptable pieces, and costs, as anticipated, were entirely out of reason. At length the purchaser repented and consented to the changes origi-

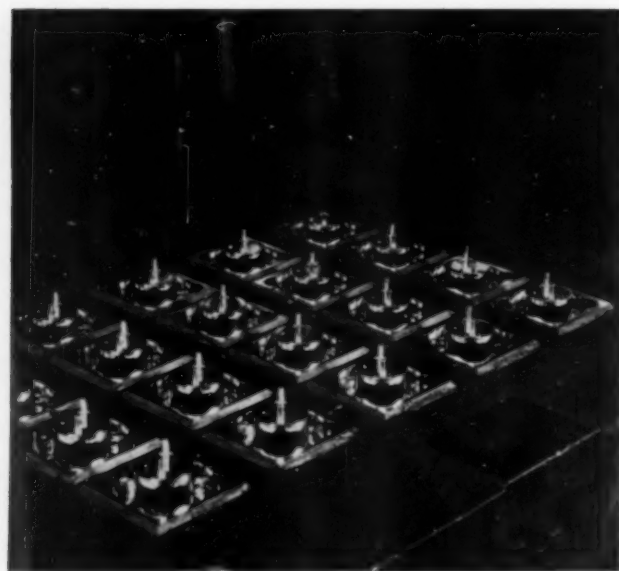
nally suggested. This involved expensive changes in the molds, but when they were changed the production in three days equaled that of three months previously; yet the product was entirely acceptable and enjoyed a substantial sale.

A molder who operates a score or more of presses 24 hours a day, six days a week, as many well organized plants do, can afford a good and experienced organization, both in selling and producing. But to work four or five presses, perhaps as a side line to some other operation, or on the proverbial "shoestring," leaves no reasonable margin either for commanding experience or for realizing a fair profit. It often makes trouble for the experienced molder with a well equipped plant and, if the work done is of a poor quality, merely brings disrepute on the molding business.

Besides the question of molding itself, there are considerations of mold design and construction which require both judgment and experience. Many plants have their own tool room for making molds and keeping them in condition, and this demands the highest grade of mechanical work, with a corresponding payroll, but is likely to mean economies for the molder as well as for his customers.

Selection of the best material for a particular job and how to prepare it for use require experience. Material manufacturers furnish excellent advice in this regard but a new material often introduces new problems which again require experience for solution. Some molders handle particular makes and grades of material with excellent results while another molder, especially if he is short on experience or does not have the equipment best suited to use, may encounter difficulties and long delays.

Granting that experience in molding is adequate, proper equipment and knowing how to use it are also essential requirements. A completely and properly

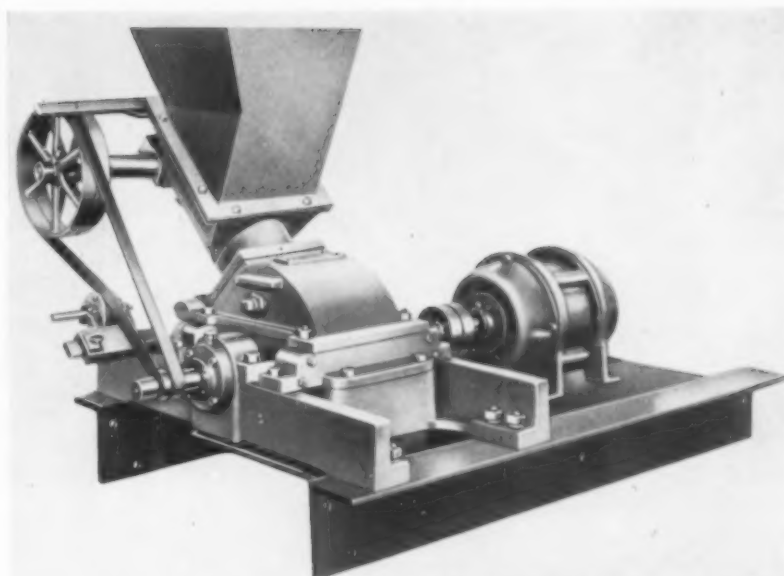


Good mold design and construction plays a most important part in plastic molding. Here is a 20-cavity mold under construction. Courtesy—General Electric Company



Skilled engravers are used for such intricate operations as putting fine lettering into a mold cavity. Courtesy—General Electric Company

A 12-inch single feed screw pulverizer on base with motor direct-connected. This machine handles pieces of molding compound up to 3 inches in size and grinds down to right granulations with minimum of objectionable fine dust. Courtesy—Pulverizing Machinery Co.

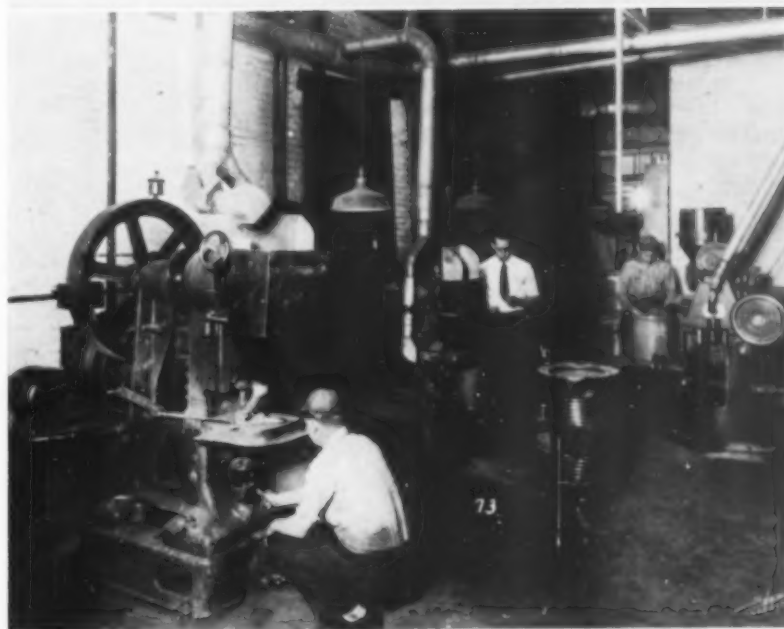


equipped molding plant will have not only just enough equipment to do particular classes of work, but will include reserve which can be called into service in emergencies or when a customer comes in with a hurry-up job that may involve getting out an old mold and putting it to work speedily. The customer may well be impatient if he finds that presses are idle because of some failure in the hydraulic system or because the boiler is down for repair and no steam is available.

Such delays can be avoided by having a reasonable amount of reserve equipment, even though this involves some added investment and some corresponding addition to overhead. Some well organized plants have from 25 to 50 per cent reserve equipment to allow for shutting down such units as may need repairs or for breakdowns which occasionally occur, especially when the equipment involves the high pressures that are required in the usual molding procedure.

A well equipped molding plant will include many presses, each adapted to the class of work to be done in it. The presses will have to be of such size as to produce the items called for with reasonable economy, with such an investment in molds as may be warranted by the total production anticipated and by other considerations. A plant which is to turn out a variety of products, both as to size of individual pieces and quantities required, will have several sizes of presses and will have them or a part of them equipped for handling either or both automatic or hand molds, or perhaps an intermediate type called semi-automatic molds. Hand molds do not remain in the press continuously. They are removed to be charged with molding compound after the pieces previously molded are taken out, and when again assembled are put back in the press to be closed and heated there. Such handling increases the length of the cycle, or the time for molding each piece, but makes the mold less expensive, as a rule, than an automatic type. The latter remains in the press continuously, must be loaded there, and the molded pieces discharged when the molds are opened.

Since all molding must be done under heavy pressure to insure a dense molding, means for applying this pressure must be provided. Most presses are hydraulically operated, and this means furnishing a

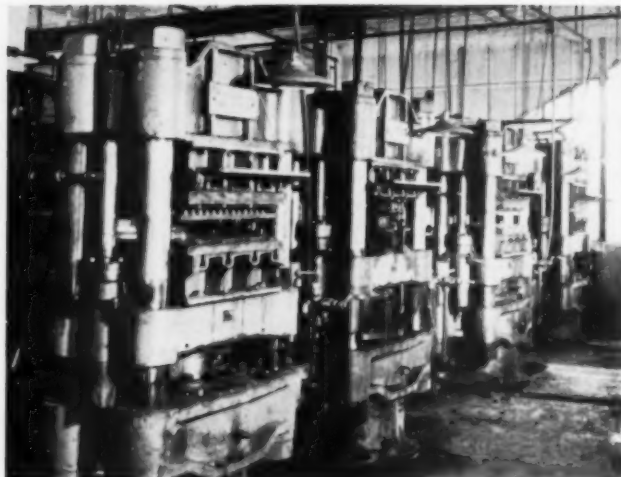


An installation of preforming presses in a molding plant. The two presses in the foreground are large size single punch preformers; the third press is a rotary preformer. Courtesy—F. J. Stokes Machine Company

supply of water or oil under heavy pressure, usually 2000 to 3500 lbs. per sq. in. To create this pressure, a special form of pump is required and, as the water is not used continuously but intermittently, means for storing the water under pressure in an accumulator is required. Accumulators are comparatively simple in construction but operate under heavy pressures and must be balanced by some means, often by an air pressure which must be maintained with a compressor. As the use of much water at high pressure is wasteful, a pump of larger size and operating at lower pressure is often employed to close the press initially, before high pressure is applied, and to open it after molding is complete. All of this involves considerable investment in equipment, as well as in piping, control valves and the like.



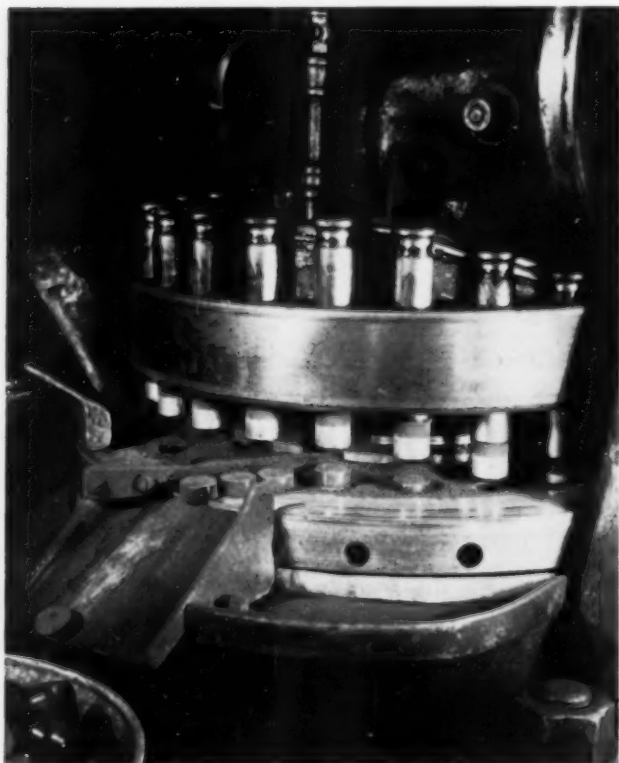
A battery of rotary presses producing ball preforms. This type will produce from 200 to 300 preforms per minute. With special shapes and certain model presses, production as high as 600 to 700 pieces per minute has been obtained. Courtesy—F. J. Stokes Machine Co.



Four of a battery of twenty presses installed in a New Jersey plant. These presses have a capacity of 315 tons each and a 30 x 20 inch die space. Operating valves are of the screw type, with special stems and seats to prevent cutting. Courtesy—The French Oil Mill Machinery Co.

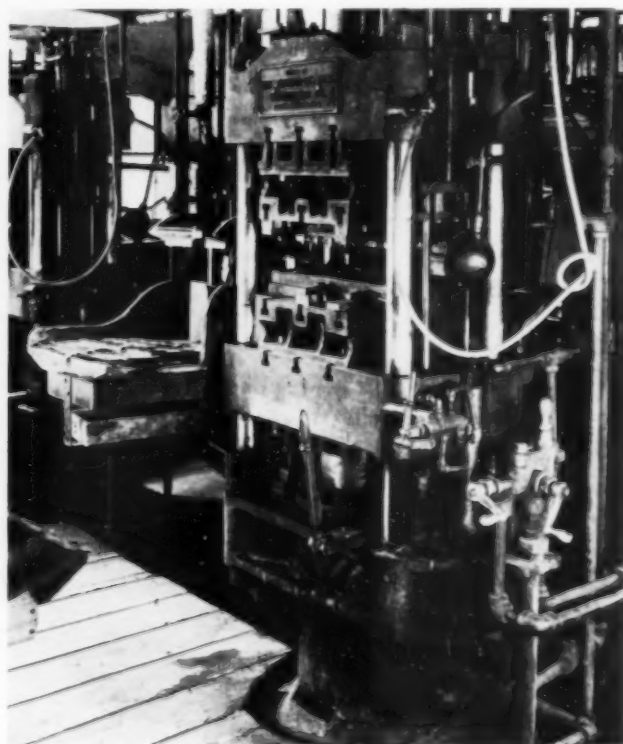
Nearly all presses used for molding must be heated by some means. Some electrically heated presses are used but, where several are in operation, steam is the more common heating means. To secure the required tem-

perature, the steam must be delivered at a pressure usually about 125 lbs. per sq. in. This, of course, requires a boiler with suitable arrangements for firing it and with attendant upkeep. In addition, there is considerable piping and many joints and fittings, as well as steam traps and return lines, involving more or less heat loss, all of which add to the cost of operation. At the presses there must be, in the case of hand molds, hot plates for supplying the heat to the molds. Automatic molds are usually cored or channeled for direct heating by steam. Electric heating, when employed, obviates the use of steam but involves a considerable charge for current and necessitates considerable control apparatus and equipment.



Closeup view of rotary preforming press. Courtesy—General Electric Company

Right: A 140-ton hydraulic press with a 20 x 20 inch maximum die space. The press is equipped with knockouts, top and bottom. The bottom platen has a combination hydraulic knockout and a lever type mechanical knockout release. The top knockouts are operated when the moving platen reaches the lower limit of the stroke. Courtesy—The French Oil Machinery Co.



Besides high pressure water and steam, presses used for molding some materials—such as cellulose acetate, for example—must be supplied with cooling water to chill the mold after the piece itself is molded. Hand molds are sometimes cooled in cold presses, and even when materials that do not necessarily require cooling of the mold are employed, it may prove desirable to cool certain pieces in the mold to help hold accurate dimensions and avoid warpage. This slows the molding cycle and adds accordingly to the cost of the molded piece. In the case of hand molds, arbor presses and some other supplementary equipment are needed to open molds and eject parts.

Entirely aside from molding itself, but related to it, is the problem of supplying the materials used in molding to the molders in proper condition and proper quantity. In some plants the molder must weigh out each charge for each cavity himself but in most cases this operation is performed in a separate department and the charges are delivered to the presses in pre-forms or tablets prepared in a preforming machine. Such machines require an operator and involve, of course, investment and maintenance charges, though they yield a net economy by speeding the measuring and handling operations. Some materials can be measured by volume under certain conditions but, however prepared, the handling of the molding compound involves time and attention which have their effect on costs.

The actual molding cycle can often be shortened somewhat by preheating the charge. This is done on hot plates or in ovens made for the purpose and may effect economies, but again requires equipment and some expenditures for heat. Most plants buy molding compounds ready mixed for use, but in some instances special compounding is done by the molder, especially when mixed colors or some unusual effects are required

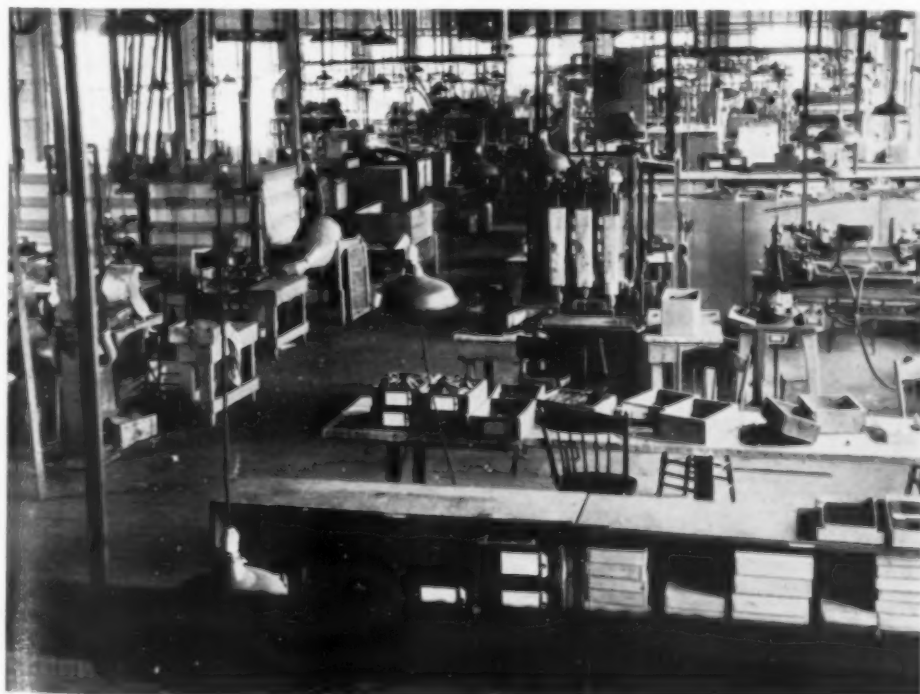


A typical molding press operation—removing finished pieces.
Courtesy—Diemolding Corporation

in the molded piece. Such special requirements are likely to increase costs but may be justified by the end accomplished.

Some types of molding involve a certain waste of material in flash and this, of course, must be allowed for in the charge for material. Some molding compounds do not keep indefinitely and any spoilage involves a loss which some one must absorb. In addition not all pieces that come from the mold are perfect and an allowance must be made for rejects that do not pass inspection. The number of rejections is largely dependent on skill and type of equipment as well as upon the type of material used.

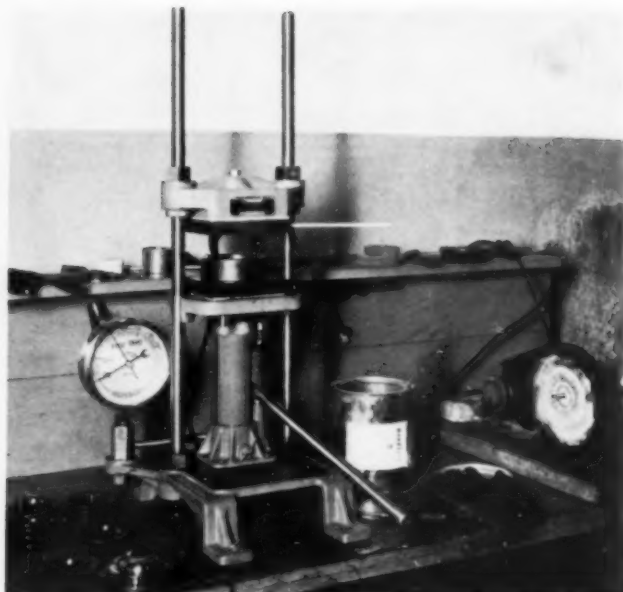
Although it is commonly pointed out that a great advantage in molding is that pieces come from the mold ready for use without need for any applied finish—such as is often necessary on metal parts, very few moldings are entirely ready for use upon issuing from the mold. There are nearly always some fins to be removed. In general, this is a simple operation, rapidly performed by hand, using a file or cutting tool of some kind. In most instances, however, special cleaning equip-



Finishing department in a large molding plant; here machine work, polishing, assembly and inspection operations take place. Courtesy—Diemolding Corporation



Abrasive band grinder or sander used for smoothing and fine finishing of molded pieces. Courtesy—General Electric Co.

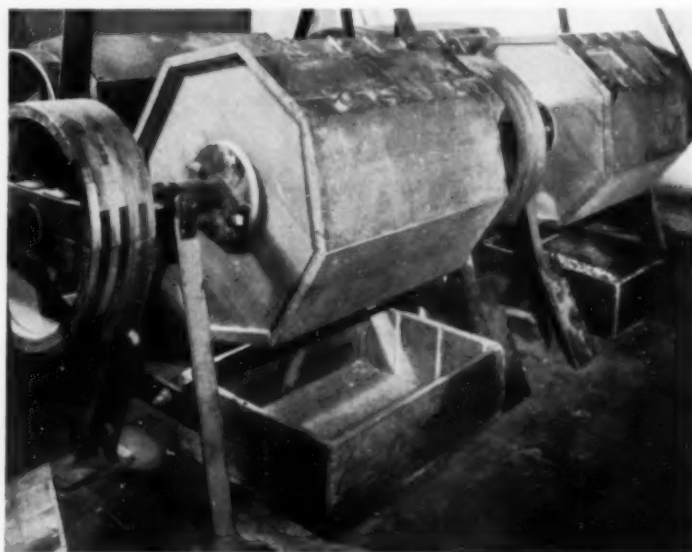


Laboratory press used for testing of single cavity molds, making samples, control work, etc. Courtesy—Fred S. Carver

ment, such as simple lathes, grinding and/or buffing wheels, sanders, tumbling barrels or the like are required, and the cost of the cleaning operations must be added to that of molding. The equipment involved and its maintenance give rise to expenses which may be overlooked by a casual observer.

Perhaps a majority of molded products are made without inserts of metal, but a large proportion of electrical parts and some for other uses involve the placing of inserts in the mold. This slows the molding cycle and, if many inserts are used, may easily double its length. Naturally, the effect of this on cost must be considered by the molder and absorbed by the purchaser. Inserts also often increase the percentage of pieces rejected for imperfections.

Subsequent to or coincident with the cleaning operations, moldings should be inspected and, if necessary, gaged so as to eliminate any pieces that do not come up to requirements. If any machine work, such as drilling or tapping of holes, is required, these operations may be performed in the molding plant when the desired equipment is at hand. All of these operations require time properly chargeable against the job. In many cases, certain assembly operations are performed by the molding plant, and in some instances a final buffing is given the pieces when a specially high polish is required.



Such operations normally involve extra charges and the same may be true also of packing, especially if individual cartons are required.

Little has been said thus far about molds, which are always required, of course, before any molding can be done. Many well equipped molding plants have their own tool rooms where molds are constructed, but in some plants this work is done by outside specialists who deliver the molds complete and presumably ready for use. In all cases a small tool room is practically necessary for repairs and upkeep. Good mold design and construction play a most important part in plastic molding and are directly responsible for the economical production of molded parts. Poorly designed and constructed molds account for continuous production losses. The designer and builder of molds, besides having a thorough knowledge of mechanical principles should also be well acquainted with molding technique.

The manufacture of molds, especially those of large size with multiple cavities, generally requires considerable high grade machine-tool equipment, including milling machines, lathes, drill presses, shapers, engraving machines, hobbing presses and grinding and polishing equipment as
(Continued on page 63)

Barrel polishing unit where molded products are completely finished. Courtesy—Rudolph R. Siebert

PLASTICS COMPETE SUCCESSFULLY WITH METAL

Problem: to devise a motor-and-switch-housing for a portable electrical device for use in barber shops and beauty parlors. To secure a minimum manufacturing and assembly cost while gaining the utmost possible degree of beauty in appearance and permanence of finish.

Solution A: Die-cast aluminum. Enamel it. This method offers a number of advantages. The casting is light, an essential for portable equipment. Holes and threads can be made as an integral part of the casting or easily machined therein. Color can be applied without too great or expensive an effort and can be varied from time to time, if desired.

There are, however, a number of disadvantages involved in the use of aluminum castings. The metallic coldness is undesirable. A considerable amount of finishing is required to prepare the casting for enameling. Finally—and most important—the enamel coat tends to flake, chip and peel under hard usage. Because of these considerations, Solution A was dropped in favor of—

Solution B: a molding of urea-formaldehyde in which the necessary threads and metal swivel for the supporting arm were achieved by the means of inserts. Here the advantages were numerous. First and foremost; the color went clear through. No amount of wear would mar the finish or cause the disclosure of underlying layers. Second; the molded piece was even lighter than an aluminum casting. . . far lighter than any other material which might possibly be used. Third; the single molding operation produced the finished housing. . . replacing the casting, finishing, enameling and baking operations that would otherwise be necessary. Fourth; color variation, while comparatively easy when enamel was the color medium, involved the mixing of individual batches of enamel. In practice,



The assembled instrument is colorful and graceful, requiring no ornamentation to increase its beauty

therefore, it would involve the running of a sufficient number of each color to justify an enamel mix, and their retention in stock while awaiting assembly or shipment. Through the use of plastics, such color variation was made possible, if desired, on much shorter runs.

There, in brief you have a case history typical of that of hundreds of manufacturers of household and other types of electrical appliances. The product under discussion in this instance, the Boydell Electric Manicuring Device, was first made experimentally with aluminum die-castings. Before entering upon production, it was decided (for the reasons outlined above) to replace this casting with a urea molding. At present, the device is made in a Lettuce Green housing. . . but the color can be varied on order. Particularly interesting, from the molding standpoint, is the variation of thickness possible under the single molding operation, side walls being as thin as one-eighth of an inch while the supporting arm, which houses the metal swivel-pin reaches a thickness of over an inch and a half. Notable also is the molding's resistance to the motor's vibration. The device is practically noiseless and vibrationless in operation, this stability being, in large measure due to the support lent by the molded material around the four threaded inserts, at each of the corners, to which the base, supporting the mechanism, is screwed.

Acceptance among users has been widespread. Manicure operators find that the device not only saves substantial time over hand buffing, but also serves to please and impress the customer. Users report this, in large measure, due to the pleasing hygienic appearance afforded the device by its molded housing.

Credit: To Toledo Synthetic Products, Inc., for Plaskon, the molding material used, to Chicago Molded Products Company for molding.



Every item shown here is a chain store "best seller." Each is either better, cheaper, or both, as compared with the glass, wood or metal products replaced. Yet less than three dollars would buy the entire lot. Thus plastics, inherently fitted for mass-production, possess likewise all the requisite properties for mass-consumption. The objects here shown are manufactured by The Bryant Electric Company.

MERCHANDISING IN MILLIONS

by E. L. Fredricks

IF any one still holds an impression that the business of molded plastics is a picayune industry, let him pause a minute and turn over in his mind the number of factories within his acquaintance that are producing upwards of twenty million units per year of any sort of merchandise under present day conditions, and making a profit.

Twenty million is a lot of anything. When it represents units of merchandise turned out yearly in any one factory with a steady and increasing market—that is a business.

All the eggs are not in one basket either. This market is maintained through more than two thousand chain stores, and through jobbers who sell to additional thousands of independent retailers throughout the length and breadth of the land.

Probably no retail market presents so clear a picture of the cross-section of American buying habits and American tastes as the chain store.

Tony, the bootblack, stops in on his weary way home to buy a new tin of black paste with which to begin tomorrow's business, and, incidentally, buys a new nursing bottle for the baby, a bundle of hairpins for the missus, and maybe a five-cent bag of candy for his other kids.

Mrs. Big-Banker tells James to wait at the curb while she steps in for two dozen hand-dipped candles for some social affair, and finds she can get the most exquisite, little candle holders which exactly match the candles she buys. So reasonably priced, too, only ten cents each. She may not know they are made of plastics—but she likes them and buys them just the same. Then, of all things, she discovers tiny ash trays which also match and can be used as favors, and she is thrilled. Her original purchase of one dollar and twenty cents (24 candles at a nickel each) has mounted to several dollars.

Both Tony and Mrs. Big-Banker know about plastics in one form or another. They have seen them evolve from electrical sockets and switches, then appear as closures on tooth-paste and other toilet articles, and finally, as coasters, ash trays, dishes and other essential items for everyday use and convenience in the well-managed home—yet priced within easy reach of the most humble soul whose pride in his home prompts him to investigate all that is new—and cheap.

Neither Tony nor Mrs. Big-Banker may know they are plastics, nor do they care. She finds the soft lus-



In addition to the dishware counters, you will find plastics mainly upon the cosmetic, novelty and jewelry counters of the syndicate stores. In cosmetics, outstanding items are closures and compacts; in novelties picture frames and liquor accessories hold the lime-light; jewelry is dominated by a wide variety of cast phenolic and pyroxylin items

trous surface of the material delightful to touch and pleasant to use, and appreciates the value of its lightness, sturdiness and the fact that it will not burn easily. He likes plastics "because she cheap and no breaka like glass."

Just for fun, let US stroll down the aisles of a chain store and see what we can see of plastics. It may be interesting.

Almost the first thing we see as we enter is the toilet goods department where plastics are used freely in the familiar role of closures. We might not mention this if it were not for the outstanding appearance of the items so capped, and it must be remembered that right here—at the point of sale, or *no sale*—is the critical moment in the life of all merchandise. It clicks, or it doesn't. Chain stores offer little in the way of professional salesmanship. Merchandise is displayed for easy handling and easy buying. Clerks do little more than take your money, wrap your parcel and answer questions. Customers browse around, here and there, usually buying more than they actually need. Why? Because things are attractive. Because they are inexpensive. And, because no one tries to sell them anything.

The deft fingers of Art in Industry have left their distinguishing mark in the toilet goods departments of the chain stores, and plastic (*Continued on page 56*)



Photo Courtesy Toledo Synthetic Products, Inc.

SUCCESS STORIES



Product: Closure

Manufacturer: Marion Lambert, Inc.

Description:

The sale of packaged cosmetics has always been complicated by the fact that it is nearly impossible for women to select, on sight, the shade of a cosmetic which exactly suits their complexion and themselves. Discovery of their mistake in selection was consequent upon application, usually after they arrived home when it was too late to do anything about it. Marion Lambert, Inc., decided to end this annoying circumstance to their customers, by reproducing on the caps of their nail polish containers the exact color of the polish when dry on the nails.

Material:

To meet the color requirement

that such a plan demanded, and to insure, at the same time, the ordinary requirements of a good closure—durability, smooth feel, and good inside threading—a molded plastic was the logical choice. The caps are made of Plaskon.

Sales Success:

Women have been quick to appreciate this simple device which makes unerring selection of a desired shade so easy. Sales have increased, and the Dew Polish is now more firmly entrenched in its field than ever before. An interesting case that demonstrates the potency of the "little thing" in merchandising.



Product: Gauge Dial

Description:

Proper lighting of the various gauge dials on the dash-board panel was long a vexing problem to automotive engineers. The

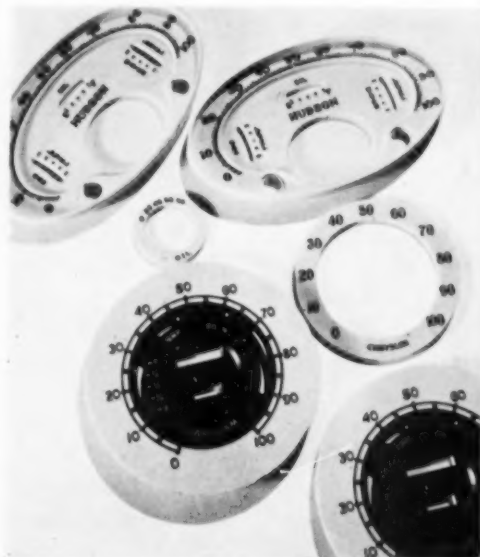


Photo Courtesy Toledo Synthetic Products, Inc.

pilot lights that were formerly used were unsatisfactory on two counts—they did not illuminate the markings on the dials clearly; their bright shine materially increased the difficulty of seeing the road ahead. The replacement of molded plastic dials for the old metal ones has changed all that.

Because the plastics are translucent, it is now possible to have the lights concealed behind the instrument panel. The resultant soft, diffused light that shines through the faces brings the black numerals into perfect contrast, and yet offers absolutely no annoyance to the night driver. Moreover, because of their far greater color beauty, the plastic gauges represent a vast improvement in good looks.

Manufacture and Materials:

The gauge dials are made of Plaskon, a urea-formaldehyde compound. The lightweight, strength and color of the material make it admirably suited for use in this way. The parts are used in combination with an overall metal gauge plate, which is either chromium plated or lacquered. The contrast thus achieved is very pleasing. Production facilities make the assembly an easy operation.

Sales Success:

Packard, Chrysler, Hudson and Graham Paige have installed the gauge dials in all their models, as have done many foreign automobile manufacturers. The 1935 models of several other makers will carry them as well.



Product: Fountain Pens and Pen Sets

Manufacturer: Inkograph Company, Inc.

Description and Design:

Two general types of fountain pens are made by the Inkograph Company. The first and older form is the Inkograph pencil-pointed pen which possesses many advantages, including ability to write on any kind of paper. A much more recent development is the Ink-D-Cator fountain pen in which the pen itself is of the more commonly used form but has several detail refinements.

In keeping with modern trends, both pens have a transparent section, called a gage, through which the ink can be seen and the need for refilling determined. An important patented feature of this design is that the transparent section has a lining of annealed shatter-proof glass which keeps the ink out of contact with the

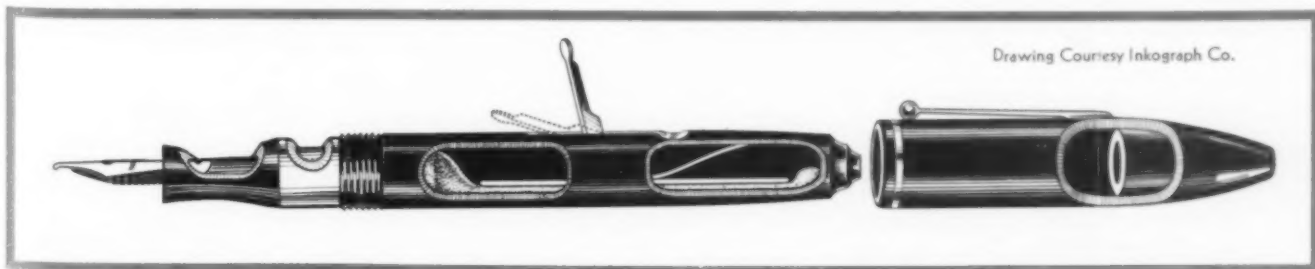


Photo Courtesy Inkograph Co.

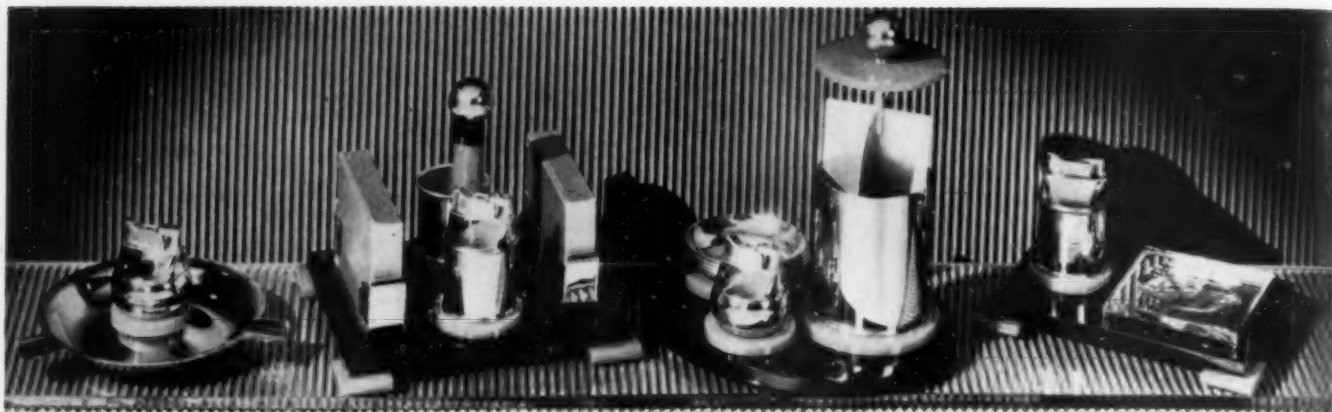
Celluloid outer casing and thereby prevents the ink from attacking and discoloring this section so that it remains permanently transparent.

In other respects, the pens involve less departure from conventional construction, but although the most popular forms retail for one dollar, details of design and care in construction are said to be equal to those involved in the manufacture of pens retailing at much higher prices and are certainly far superior to those involved in the general run of inexpensive pens.

All current models are characterized by sturdy and well-balanced construction, a good feel in the hand, and a smart appearance which make it acceptable to almost any user. The least expensive and most popular dollar models are jet black and have nickel-silver trimmings. The more expensive models and desk sets are available in various colors and pearl-like effects of great natural beauty. Some models, made to retail at \$1.50 have a propelling pencil at one end and the same pen construction used in other models at the other end. The combination pocket and desk set includes the pen-pencil assembly, but the pencil portion (*Continued on page 50*)



Drawing Courtesy Inkograph Co.



FOR THE STYLE-MARKET

IF you manufacture a product for a "style-market" you have a problem on your hands. If you manufacture products designed for long and hard usage, there, too, you have a problem to contend with. But when your product must meet both these conditions, when it must, moreover, hold its own in a highly competitive market—then your Problem should be spelled with a capital P!

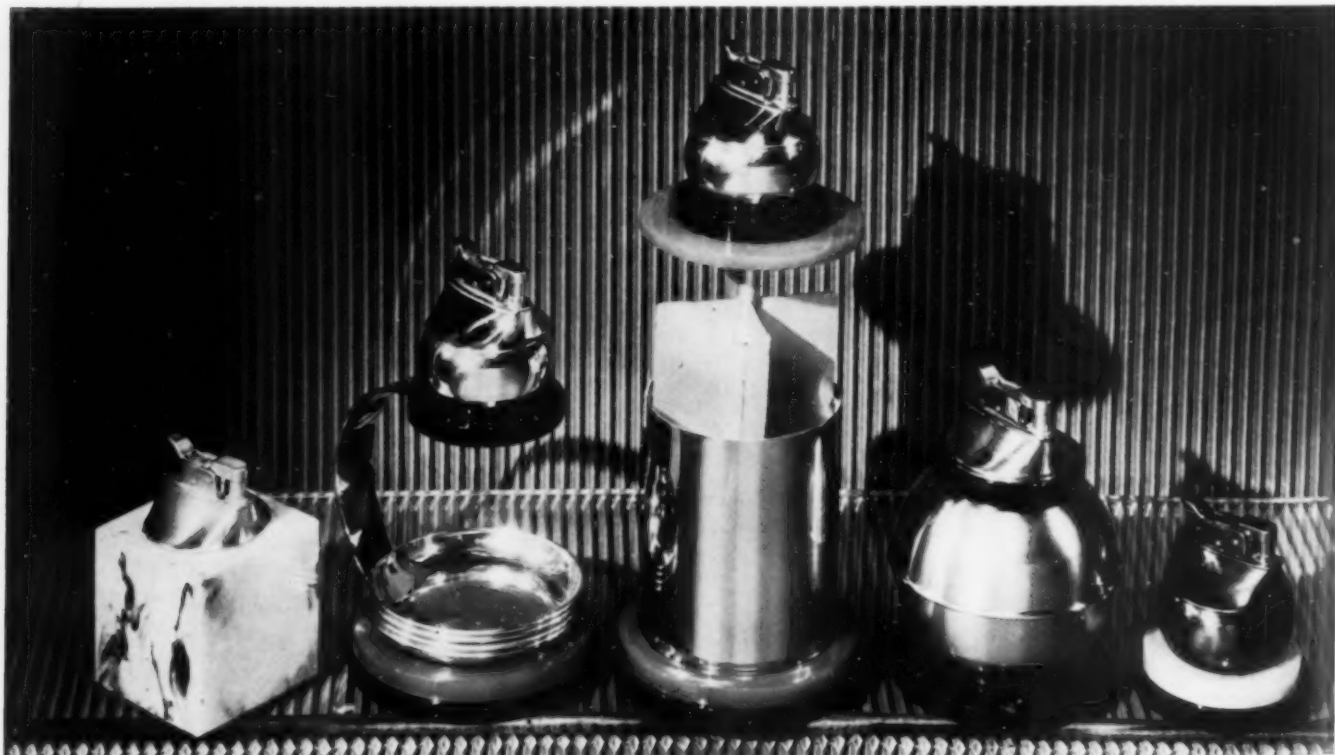
The materials you use must be beautiful in themselves. They must have a fine surface and unlimited color possibilities. They must permit of fabrication in a wide variety of shapes, designs, colors and textures to meet changing style trends. There's half your problem.

The materials you use must be easily fabricated. Changes in design must not involve expensive changes in your plant. New designs must be possible in short order and at minimum tool costs. Most important, costs must be low even when quantities are small. For it is impossible to predict, in advance, the market for any particular item.

There are the two horns of the dilemma, and many a manufacturer has been tossed for many a sleepless night upon them.

An increasing number of companies have found an "out," however, in the use of cast phenolics, materials which meet every requirement of appearance and production in case after case. All of which brings us to Evans Case—a case history which, despite the unavoidable and inexcusable pun, should point the way to many other manufacturers of small and medium sized style merchandise.

The Evans Case Company manufactures a line of smokers' articles built around the company's automatic cigarette lighter. Since the lighters themselves required metal fabrication equipment, it was but natural that an expansion of the line to include decorative desk lighters and lighter combinations should be made along metallic lines. This procedure was followed with marked success, a number of items which consisted of metal and soft en- *(Continued on page 55)*



RAYMOND LOEWY TELLS WHY

An interview reported by E. F. Lougee

WHEN I asked Raymond Loewy, industrial designer, what he thought about the future of plastics, he replied: "I'm afraid anything I may say about plastics will sound like advertising. I am frankly prejudiced in their favor and you will see in my work that I always take advantage of plastic materials wherever it is practical to use them."

"Don't you feel they have very definite limitations?" I asked.

"Perhaps! But I prefer them to other materials for many uses. There is hardly a job where the soft dull lustre of some well known brand of plastics will not add utility and decorative quality to its design."

"Why do you prefer plastic material?" I continued, trying to get to the bottom of his enthusiasm.

"Because it permits new methods of handling old problems. Furthermore, it is new! It is smart! It is *modern!* And because it lends plainness and simplicity which is the true goal of modern design. Let me show



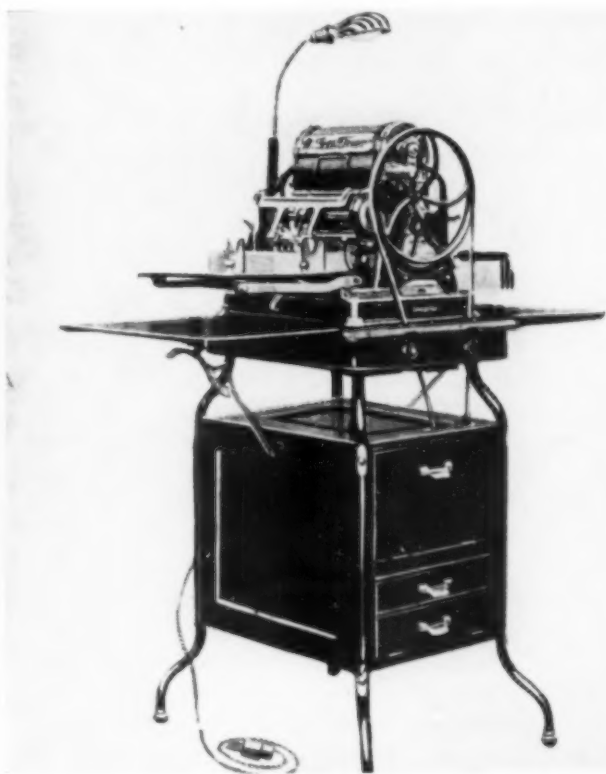
Raymond Loewy, whose recent design of streamlined locomotives for the Pennsylvania Railroad adds another notch to his belt of fame

you!" He brought out a bunch of photographs, and chose the duplicating machine he designed for The Gestetner Company, as an example. The old and new are reproduced for you to see.

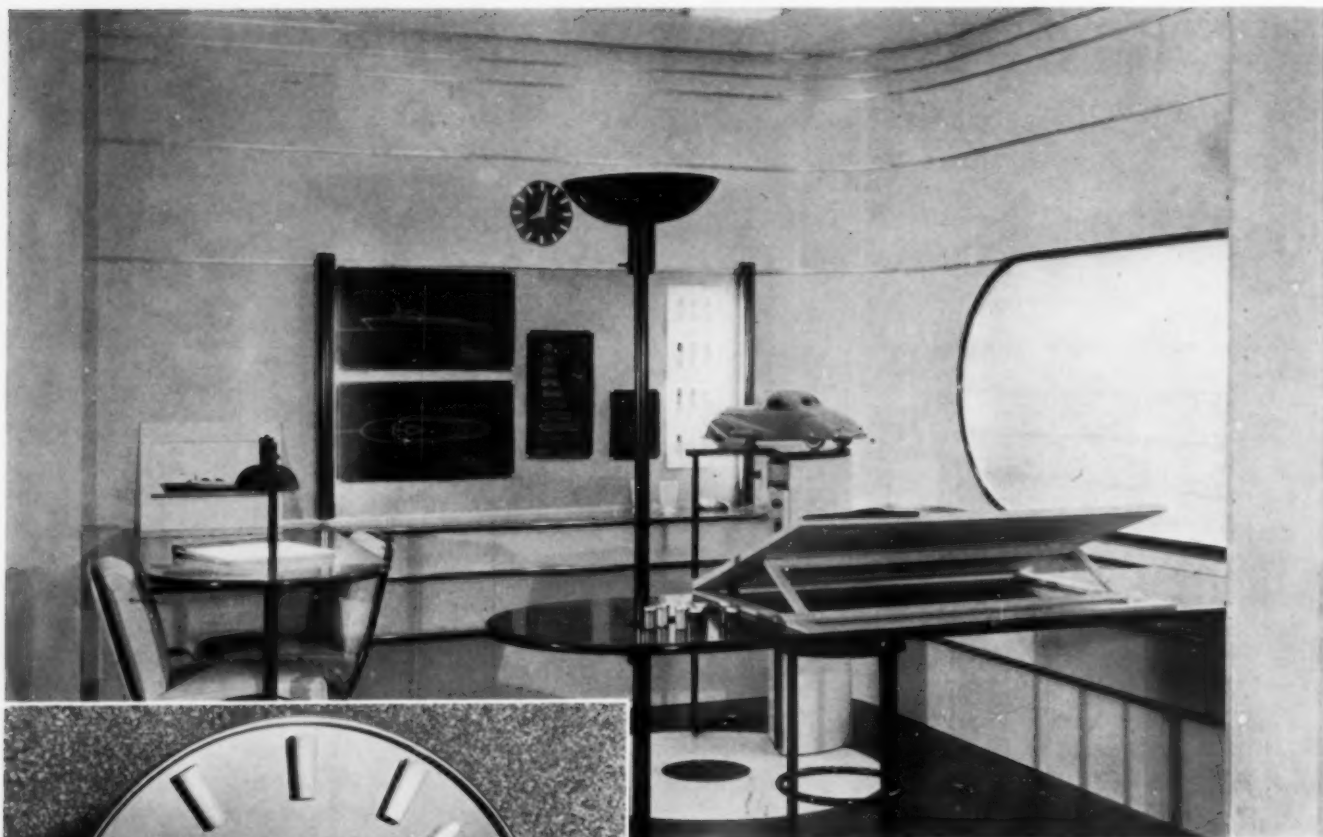
"The legs on the new model are straight," he pointed out, "thus avoiding any danger of tripping over them. The top of the filing cabinet on the old model was exposed and the surface became coated with inky, oily dust. This has been eliminated. Gears on the previous model were exposed and it was necessary to finish and nickelplate them. These parts are now left unfinished and covered with a phenolic shell. This shell has eliminated the necessity of

plating and polishing nearly one hundred small parts, and the manufacturing costs have been considerably reduced.

"The flowing top of the new cabinet is designed to avoid any dust accumulation. You will notice, too, there is no driving belt exposed, and that the handle folds in close to the shell when not in use.



The old and the new Duplicating Machine showing the plastic shell which eliminates the need for polishing and plating more than one hundred small parts, while improving appearance and making for greater ease in use



Office-Studio for an industrial designer, designed by Raymond Loewy and Lee Simonson and exhibited at the Metropolitan Museum of Art. The wall paneling and the cabinets are of pastel-shaded laminated plastics. The clock (shown in detail at the left) has a face of blue glass, red-gold hands, and numerals of ivory plaskon. It is now being manufactured commercially by the Warren Telechron Co.

"A 26 per cent increase in sales during the first six months after the new design was introduced may be interpreted as customer appreciation of clean design."

Then he showed me a photograph of his design for the new streamlined electric locomotives being built for the Pennsylvania Railroad; fifty-seven locomotives representing an expenditure of more than fifteen million dollars, and the largest single order ever placed for railway equipment. Each locomotive is eighty feet long, has twenty wheels and develops five thousand horsepower.

"Where are you using plastics on these?" I asked hopefully.

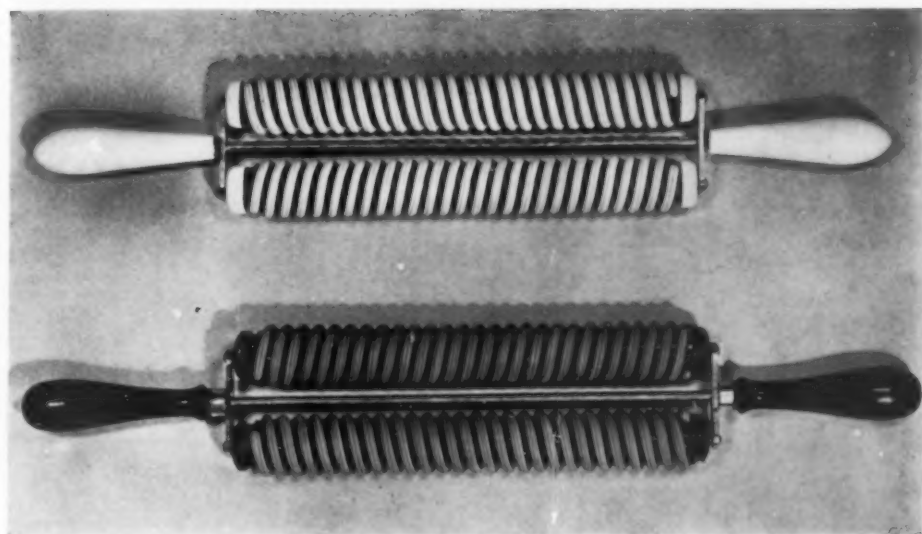
"Well," he replied, "there isn't much opportunity for plastics on this job beyond their well known uses as electrical insulation. There is plenty of it used in that particular, however, and I am making tests to determine the advisability of recommending its use with

metal inlay for the "Keystone" emblem of identification."

"Where do you think plastics can find their greatest potential market in the present scheme of things?" I continued.

"In shipping and passenger service equipment," he replied with conviction. "The uppermost question in the minds of carrier executives at the moment is the complete solution of passenger safety. The recent disaster of the Morro Castle has brought about a condition which makes passenger safety imperative in future construction, and means that obsolete construction with inflammable materials must be changed in present equipment if any degree of public confidence is to be enjoyed.

"Fireproof materials for interior finish of all private and public rooms of every ship afloat is the logical step. Choice of materials is limited to metal, asbestos, and plastics. Metals are cold and unpleasant to the touch. They are expensive to finish, and even baked enamel becomes scratched and unsightly through usage. Asbestos is difficult to finish in any manner, which leaves plastics the most practical material for this gigantic job. Their natural coloring and finish is pleasing and permanent, and they are sufficiently fire-



In the re-design of this massage-roller, Mr. Loewy has relied principally upon a change in color from black to white, achieved through the use of molded urea plastics on the roller handles

Lighting fixtures can use plastics to advantage, as well. Translucent plastics are more flexible and less breakable than glass for indirect lighting, and quite as efficient.

"So much for steamships! But let's look beyond this for a moment. In a surprisingly short time, transoceanic plane service will be established be-

resisting to meet the most exacting requirements. Properly applied, they will outlast the ship they protect. Wisely chosen, they will create an enchanting atmosphere, and add materially to the pleasure and safety of those who travel.

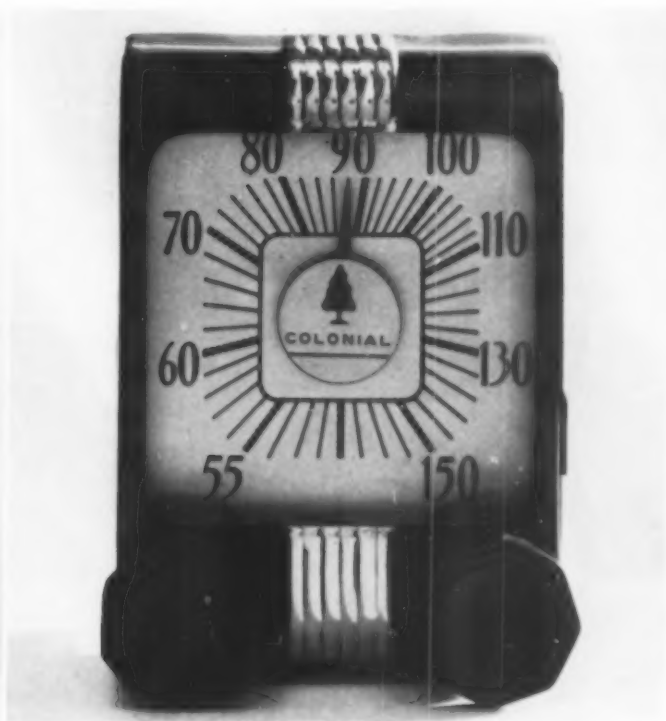
"Many millions of dollars will be spent in the immediate future. Plans are already under way. One such plan calls for an expenditure of between 20 and 30 millions in fireproofing present equipment.

"Those who make plastic compounds would be smart to design model cabins and public rooms indicating the practical uses of their materials, and make these models available for steamship companies to see and consider. Wall paneling, ceilings, doors, bath equipment and hardware may be made of plastic veneers and moldings and combine delightfully in modern design.

tween this country and Europe. It is already successfully operating between many other countries. More millions of dollars will be spent in the construction of planes, and fire-proofing is certainly no less to be desired in the air than on the sea. It is imperative!

"Plastics, being lighter than metal, have the advantage. Difficulties in acoustics are already being ironed out, and, once overcome, there will be no more suitable material for plane interiors. Its use as insulation is firmly established. Spark plugs are shielded with plastic to render them incapable of interference with radio operation and reception.

"Streamlined trains are still a novelty. People stand in line awaiting a chance to pass through the cars and gasp with awe at what they see. A few years hence and the present trains (*Continued on page 54*)



"Before and After" of the Colonial automobile radio dial, re-designed by Raymond Loewy. Note particularly the re-shaping of the molded control knobs for greater convenience in use and closer harmony with the rest of the design



One of the largest of the molded jobs shown was this three-piece ledger-cover, molded of brown phenolic material by The Kurz-Kasch Co.



Consumer interests were aroused by these pouring spouts, molded of red phenolic material by The Boonton Molding Company

EXHIBITION DEMONSTRATES PLASTICS' VERSATILITY

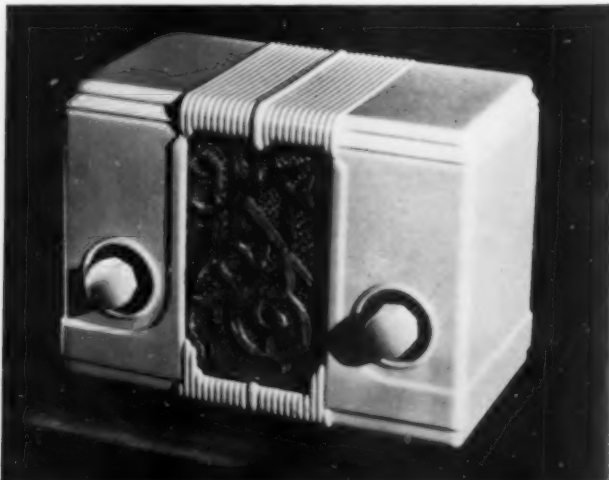
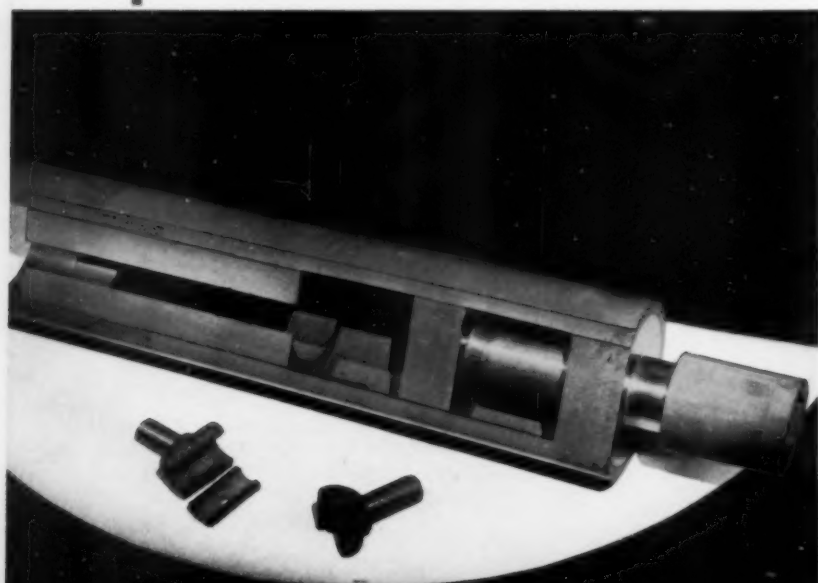
THE enormous scope of the plastics industry, both in its present state of development and in its future potentialities has been amply demonstrated by the twenty-five thousand objects shown at the First Annual Plastics Exhibit, sponsored by Modern Plastics and held, within the last month, at its New York Exhibit Hall.

Shown on these pages are a few of the objects which, because of their structural features, size, color or in-

genious molding, excited particular interest among the thousands of visitors to the exhibit. Particularly noteworthy, to those interested in the fostering of the further use of plastics, were the questions asked by those who came to look and remained to consider the direct application of plastics to their own products. These questions demonstrated, once again, the vast amount of educational work necessary before the general public will be fully aware of plastic (*Continued on page 52*)

Outstanding among the laminated plastics group were these bearing sand rollers, manufactured by the National Vulcanized Fibre Company

Molded radio cabinets were the talk of the show. Particular attention was given to this Plaskon case, molded by Chicago Molded Products Co.





Left: The Richardson Company's exhibit demonstrated versatility as to design and size, the group shown illustrating a range of from one-quarter inch to over two feet



Right: Notable in the electrical section were these giant switch housings, molded by The Kurz-Kasch Co.



This coffee-making set (handles of black phenolics), including a small portable stove, attracted much attention among the household

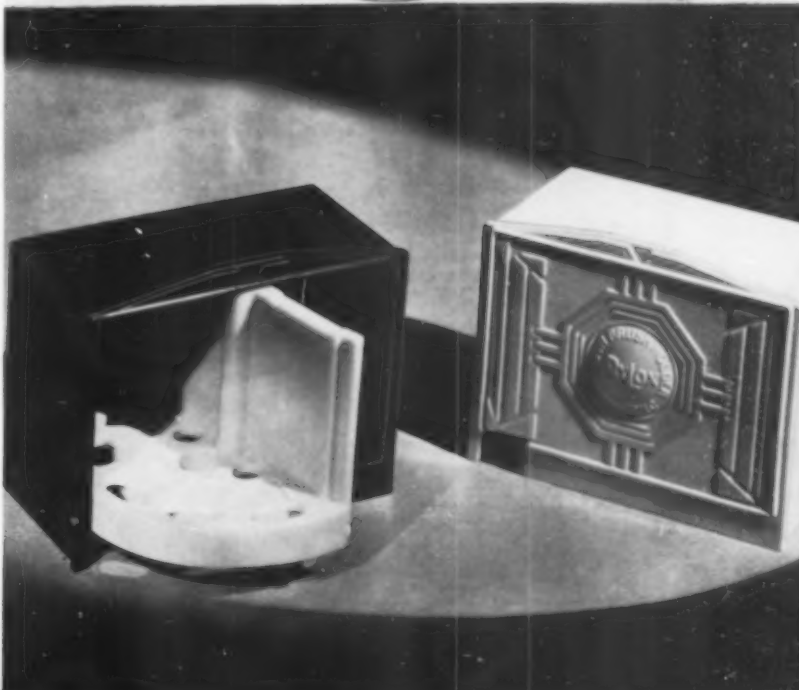
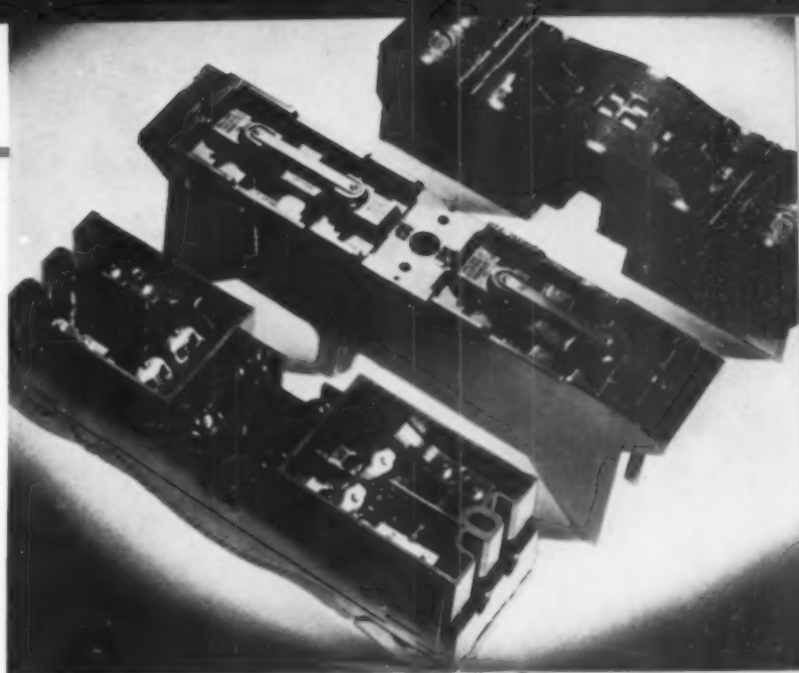
appliance group. Handles and fittings were molded by The Kurz-Kasch Co.



Of greatest interest to the greatest number were the low priced molded novelties. Outstanding among these was this SyLox sanitary tooth-brush holder, by the American Insulator Corp.



Below: Although its appeal was restricted to industrial users the Haveg corrosion-resisting equipment of the Continental-Diamond Fibre Co. elicited innumerable inquiries



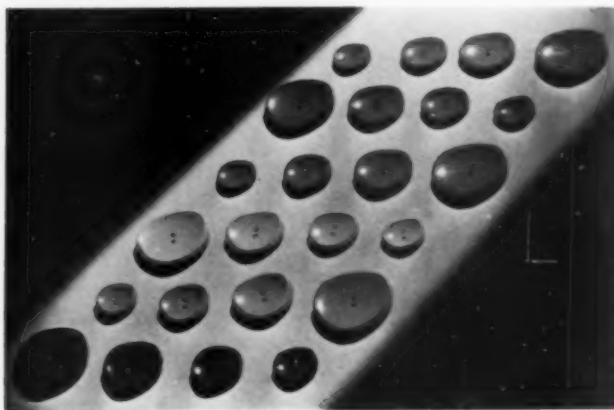
PLASKON

CAPS:

The shades of nail polish are legion in number, but so are Plaskon's colors. And thereby hung the solution to a vexing problem in marketing the former. It was Marion Lambert, Inc. who decided to make the caps on their bottles match the color of the polish when dry on the nails, and so reduced the task of individual color selection to child's play. A glance at the cap tells the feminine purchaser exactly how her nails will glisten after applying a particular polish. Plaskon's unrivaled color range easily kept pace with this extraordinary require-



ment for different and exotic colors—just as Plaskon tensile strength and Plaskon durability satisfied the need for those qualities. Molded by Armstrong Cork Company.



BUTTONS:

A button to the wearer may be just a button, but to the clothing industry it's something else again. Strength, color, and permanence of color are some of the essentials for a good button. Design, finish, smoothness of edge around the holes, strength of the bridge between the holes, and a slight extension on the back, behind the holes—these are all important, and looked for by the expert's eye. And of course buttons must be decorative, harmonious, capable of holding their color against boiling and of being sewed on strongly enough to resist the strain of washing and of pressing machines. So naturally Plaskon—molded color—is the smart and the popular button material. Colt is the molder.

MOLDED COLOR

GASOLINE PUMP GLOBES:

Not very long ago, and quite unostentatiously, Plaskon glided into the service station in the form of frames for globes on gasoline pumps. These standards brought definite advantages; over metal frames because they are translucent and have permanent color; over complete glass globes because they are stronger, cost less, and are easier and cheaper to ship; over glass frames for the same reasons plus the added one of easy assembly. Since their debut, Capcolite frames made of Plaskon for the Cincinnati Advertising Products Company have become standard equipment for the truly modern station. Molded by Kurz Nash.



CONTAINER:

The enduring color beauty of Plaskon containers need no brief, no introduction. They are on daily display on the store shelves of the nation—beckon-



ing the consumer, profiting the manufacturer, guarding a thousand products within smooth, sanitary surfaces. But direct sales appeal is hardly the extent of Plaskon utility. The Sun Sweet Fruit Products Company knows that. Their breakage in production and their shipping costs have swooped to a new low since they've packaged with Plaskon. And Sun Sweet customers are acknowledging the reuse value of the new containers in the most delightfully tangible way they know how — increased consumption. Molded by Reynolds Spring Company.



NEW IDEAS IN PLASTICS

AS a means for facilitating the entry of molded articles into the low price field, a newly patented German invention provides for making dishes and other housewares, novelty goods and the like with a paper core and a molded surface, bonded to the paper core with a thin film of glue. In addition to the saving in molding powder, molding time is shortened because the synthetic plastic layer surrounding the core is thin, and thus the output capacity of the molding equipment is increased. Very fine decorative effects can be easily obtained, and shapes can be readily fabricated which are ordinarily quite difficult to produce. (Gebrüder Adt Aktiengesellschaft, Ger. P. 592,927.)

A new sound collecting mouthpiece for dictating machines offers increased durability, convenience of form and improved acoustical efficiency, achieved by refinements in design. The body portion bears a convenient finger grip and a button switch opposite thereto. The mouthpiece is molded in two parts, both of nitrocellulose plastic; the body portion is relatively thin and the lip portion is made thicker, but is so securely bonded to the body portion that the two parts practically form an integral structure. (Henry P. Roberts, Dictaphone Corp., U. S. P. 1,980,293.)

MAKERS of molded brake linings have had to strive for the best possible compromise between the low thermal stability of the organic plastic binders (softening and charring at high service heats) and the deficient binding quality of the inorganic binders such as silicates. But a new molded lining is now proposed in which the organic plastic binders (natural or synthetic resins) are successfully used without sacrificing heat resistance. A glycerol-litharge cement is used as a carrier for the plastic binder, and asbestos powder is added for increased heat resistance, with bentonite or talc as a dispersing agent. (Firma Louis Blumer, Ger. P. 591,846.)

SILENT gears can now be made with such improved strength and resilience that the desired quiet running is achieved without any permanent deformation. This means, not only that the accuracy of the meshing with other gears is retained longer than in gears made by earlier methods, but also that abrasive wear is much lessened. These benefits are gained by the apparently simple expedient of heating the laminated, phenolic resin impregnated fabric in a vacuum before the molding operation. This draws the synthetic resin solution from the interior to the surface of the individual fibers, so that fiber elasticity is retained and the finished gear wheel has a resilience not hitherto attained. (Allgemeine Elektrizitäts-Gesellschaft, Ger. P. 582,798.)

A box toe blank, with superior properties for shaping and application in shoe manufacture, is made by the novel expedient of making the blank in sandwich form with a cellulose ester interlayer, somewhat after

the manner of safety glass but with plastic-impregnated fabric instead of glass serving as the outer layers of the sandwich. The fabric layers of this laminated box toe blank are impregnated with a plastic which is not taken from the substance of the interlayer but is supplied from an outside source; and this plastic, if it is not of the same composition as the interlayer, must be a material which is gelatinized by a selected liquid which is a solvent for the cellulose ester interlayer. (Stanley P. Lovell, Arden Box Toe Co., U. S. P. 1,980,810.)

TO find a perfect material for artificial dentures is a difficult matter, largely because the denture must be thoroughly harmless to and compatible with the sensitive tissues of the human mouth. A molding composition which approaches a step nearer to the ideal denture material is made by combining ethylcellulose (for transparency, elasticity, water-proofness, alkali resistance and freedom from shrinkage) with a polystyrene resin (for hardness and molding quality) and a plasticizer which may be camphor or a phthalic acid ester or the like. The composition can be easily colored in imitation of mouth tissues. Blanks are first shaped at 221-230° F. and the dentures are molded from these blanks. (Walter, Wolf and Anna-Marie Hengstmann, Ger. P. 581,675.)

THE entry of synthetic plastics into the molded arch support field has hitherto encountered a serious obstacle in the large number of sizes required, necessitating a large outlay for the many expensive molds needed to cover the size range. By a new invention, however, a fibrous synthetic resin composition is made up in flat blanks from which arch supports can be stamped out, softened by heat, and finished by molding at low pressure in inexpensive molds. This permits mass production at a moderate manufacturing cost. (Wolfgang Hirsch, Ger. P. 583,037.)

AN abrasive wheel for fine grinding is made with diamond fragments in a resinoid bonding medium, molded on a strong, rigid core which is capable of withstanding the severe conditions of a high pressure, high temperature molding operation. By using such a core a hardenable resin bonding agent can be used, and the necessary severe heat for hardening the resin can be safely combined with the pressure molding operation. (Balis Sanford, Norton Co., U. S. P. 1,981,970.)

PHONOGRAPH records can now be made with only about one-seventh as much of the expensive montan wax as was formerly necessary to give the shellac molding composition the required properties. A small quantity of a phosphatide, such as soy bean lecithin or the less pure slimes formed in refining linseed oil, is added to the montan wax, so greatly enhancing the potency of the wax that great saving is effected. The phosphatides are useful (Continued on page 53)

TRANSLUCENT LAMINATED PLASTICS OPEN NEW VISTAS TO ARCHITECTS AND INDUSTRIAL DESIGNERS

LAMINATED PLASTICS have long held undisputed sway in industrial fields where their use as gears and machine parts provided obvious advantages over other materials and, frequently, afforded these advantages at a lower cost than that of the traditional materials which they replaced.

In the decorative field their use has been likewise broad in the number of their applications although it cannot be said that laminated plastics have won as thorough an acceptance here as in the strictly industrial field. This has been due in part to the greater inertia of those who plan for appearance rather than utility alone—quite understandable and logical resistance to too hasty a change. In part it has been caused by the relatively high prices at which laminated plastics have been available—prices which, until now, have precluded extensive competition with the cheaper building materials and re-

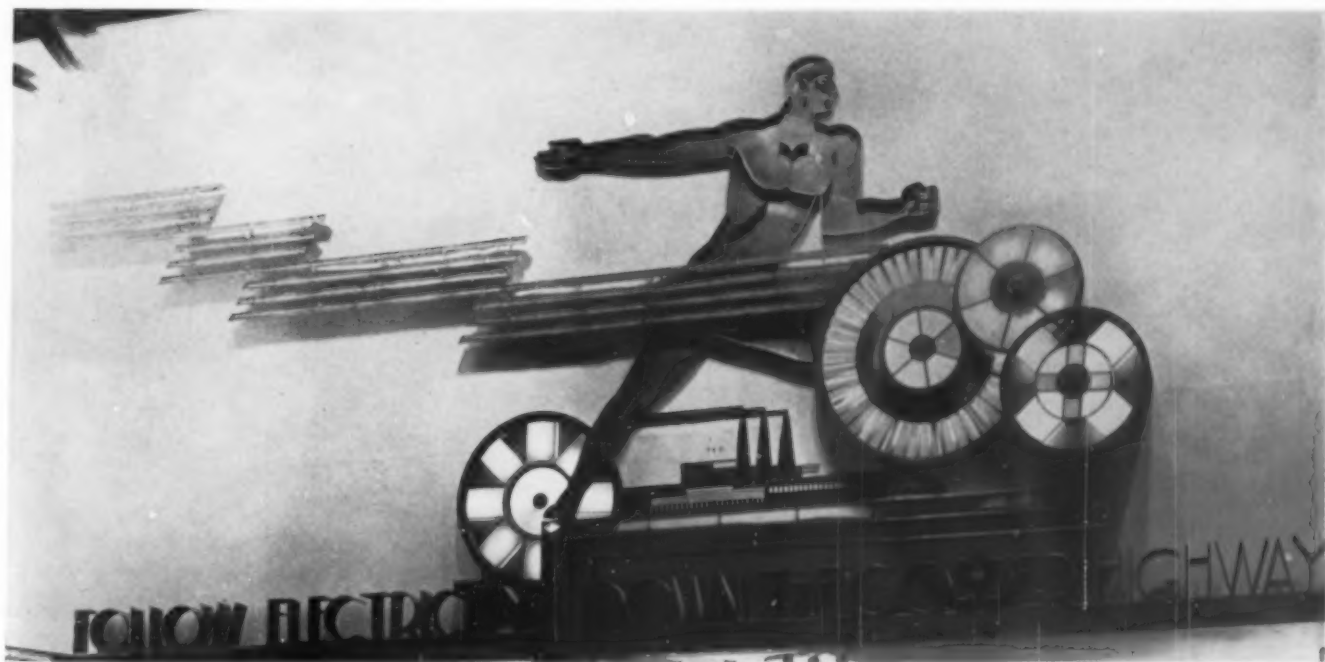
stricted the use of laminated to those frequent instances where plastics replaced one of the more expensive building materials such as marble or wood paneling, where plastics provided a decorative effect so desirable as to reduce the importance of the cost element or where plastics serve not merely in their decorative function but also provide structural or use advantages.

Instances of this last type will be found in the use of laminated materials for their fire-resisting qualities or to reduce the maintenance cost of much-frequented elevators, corridors and lobbies, where other materials would require periodic surface renewals.

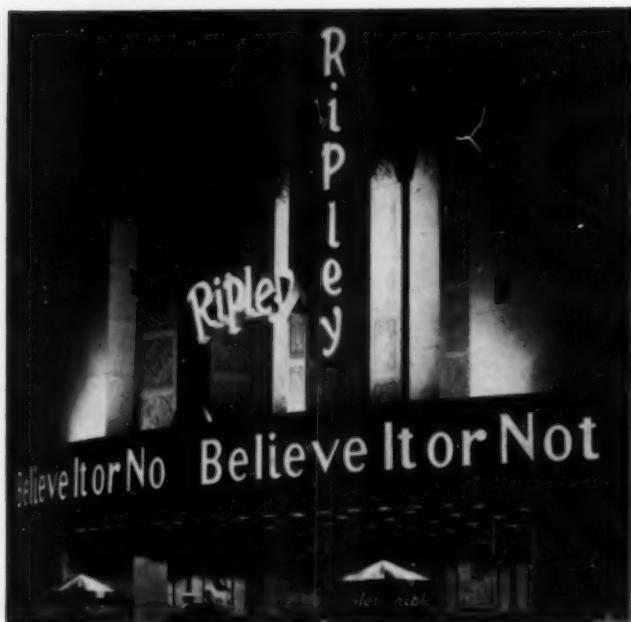
Any one familiar with the many articles on the subject published in this magazine is aware of the growing importance of laminated plastics and of the opportunities they offer the competent designer, engineer or architect. Until recently, however, these opportunities were restricted to opaque



Surmounting the Walgreen exhibit at the Chicago Fair was a ten foot high revolving sign, twenty feet in diameter. The face of each letter was made of a yellow urea formaldehyde lamination, one sixteenth of an inch thick. The sign passed through two seasons of Chicago weather without repairs or noticeable wear



One of a series of installations of laminated urea formaldehyde at the recent Chicago World's Fair. Here the Commonwealth Edison Company utilized small panels of thin laminations, in a wide range of colors, to form the lighted symbolic discs. Photos on this and the two following pages are shown through the Courtesy of the Continental-Diamond Fibre Company



Illustrative of the possibilities for brilliant lighting of signs is this group from the Ripley "Odditorium" at the Fair. Sheets one-sixteenth inch thick were cut to shape to form the separate letters. The advantage is claimed for this material, over previously used materials, that there are no light spots

surfaces where color, design, texture, ease of fabrication and wearing qualities were important.

Now, however, the commercial perfection of urea formaldehyde laminations has made possible the wide

extension of the uses of laminated materials to all those many instances in which the ability to transmit and to diffuse light is important. Associated with the opaque laminations, these translucent sheets should serve to make possible more complete installations of laminated decoration. On their own, they have obvious markets wherever signs are shown or light transmitted.

One material of this type, Dilecto UF, made by the Continental Diamond Fibre Company, has already been widely used for interior and exterior decoration, for advertising display and for illumination. Possessing high electrical and mechanical properties, this material is likewise resistant to water, alcohol, acetone, oil and other common solvents—qualities which offer pronounced advantages over non-plastic substitutes.

Of greatest immediate importance, however, are the qualities which fit urea formaldehyde laminations for application in the illumination field. Listed, these are:

1. Ease of cutting into intricate shapes.
2. Elimination of danger to the public in the case of breakage, as compared to glass.
3. Perfect diffusion with excellent transmission of light and the deep, rich quality as compared with glass.
4. Sunfast colors and a wide color range.
5. Non-inflammability and heat resistance, as well as resistance to temperature change.
6. Light weight.



Dressing booths and "try-on" rooms in the Columbus, Ohio, shop of Mrs. Eugene Grey, Inc., utilize partitions of light toned laminated ureas both for their decorative effect and to obtain the greatest possible diffusion of light through all the booths. Designed and executed by Carl B. Frey, Inc., this application is illustrative of the many possibilities for the material in interior decoration and in store and office partition construction

The process of manufacture is similar to that used in making ordinary laminated sheets, the base consisting either of a paper or a fabric. This is treated with a urea varnish and then molded between pressing plates in a hydraulic press under heat and pressure. In this operation the resin is converted into a hard, infusible product. The pressed sheet is translucent and, in thin sections, is transparent.

In various colors, this material may be obtained in sheets, rods or tubes. It can be machined or cut in any direction and may be bored, sawn, resurfaced and polished. It can be punched hot up to and including the one-sixteenth inch thicknesses. In the appended table will be found a listing of the physical and electrical properties of a sixteenth-inch-thick representative specimen of this type of lamination.

The possible uses of urea formaldehyde laminations are quite broad. In addition to those illustrated, such applications as transparent indicators for radio dials, switchboard insulation (where appearance is important) and molded trays come readily to mind. The material has possibilities, in many cases, as a substitute for glass, (absorbing ultra-violet rays but slightly) and should have usefulness in the electrical field in cases where non-plastics are now used.

Particularly in combination with the non-transparent and non-translucent decorative laminations, can opportunities for the use of laminated urea formaldehyde be visualized. By eliminating the need for employing a different group of workmen to apply the light-passing surfaces (as would be required were glass used) builders

LAMINATED UREA FORMALDEHYDE (DILECTO UF)

Physical Properties

Specific gravity.....1.45 to 1.49
Tensile strength, lbs. per sq. inch...8,500 to 9,322
Flexural strength, lbs. per sq. inch...16,800 to 24,082
Hardness (Brinell).....32.5 to 39

Electrical Properties

Dielectric strength, volts per mil...482 to 600
Dielectric constant
Measured at 500 kilocycles.....6.5 to 7.45
Power factor
Measured at 500 kilocycles.....2.88 to 3.69
Loss factor.....18.7 to 27.5

should be able to effect decided economies of labor.

From a decorative viewpoint and from that of wear and replacement, the advantages of such a material combination are obvious. In this sense, the translucent material is complementary rather than competitive with the older decorative laminations, the use of one leading to the use of the other. Yet it must be remembered that neither type of material is restricted to use with the other, since both can be, and have been combined to advantage with metals, glass, wood, plaster and other familiar materials.



Designer Carl B. Frey has utilized laminated ureas for both lighting and decorative purposes in the Ionian Room of the Deshler-Wallick Hotel in Columbus, Ohio. Note particularly the purely decorative use on table tops, where light transference is not a factor. Through the use of urea laminations, it is possible to carry out the decorative scheme of light-colored rooms on the accompanying furniture, a utilization particularly fitting for a material possessing urea's wear-resisting qualities

'I COVER THE DEPARTMENT STORES'

1. *Plastics in Tablewares and Cutlery*

by Ruth Lampland

WHAT is the situation in New York department stores this season with regard to molded plastic materials used in tableware and cutlery?

How much do buyers and sales persons know about plastics—their properties, their names?

How are plastic products selling in contrast to other materials like wood or metal, used for the same products? Are they replacing the former materials or continuing in competition with them?



Reported by McCreery's as an outstanding best-seller, these whistling tea-kettles have molded handles and whistling spouts in black, red or green

The Russell Stainless Steel table service is distinguished by handles in gay colored cast phenolics as well as in the stable black and white. Store executives report high sales because of the inclusion of accessory service pieces—bouillon spoons, butter spreaders and large serving spoons

What is the consumer reaction to the various types of plastics?

What aids do buyers and sales persons need, and wish, from manufacturers?

With these questions in mind, the writer made a tour of leading New York department stores, from the higher price brackets represented by Franklin Simon and Lord and Taylor, who handle primarily gift items, to Hearn's, who hit the lower popular-priced group. The large middle price group—Macy's, Gimbel's, Bloomingdale's, McCreery's—was also included.

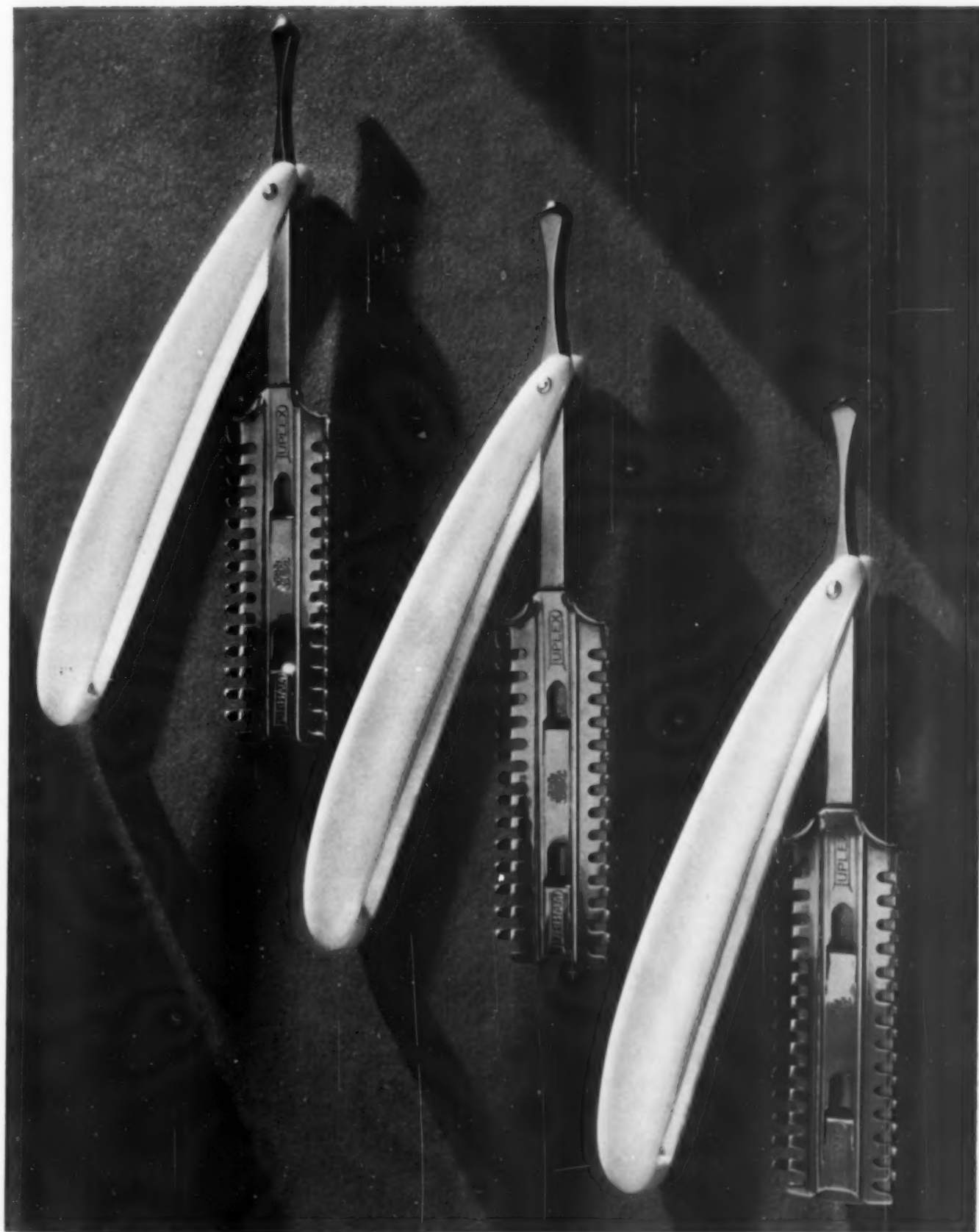
The field of "tablewares and cutlery" is so large that we found it necessary to limit our research to certain phases of it, in order to get a sensible, comprehensible report. So we confined our "housewares" study to four groups: giftware (chromium and other metal gift items, electric or non-electric) with plastic parts; cutlery—knife and fork combinations; all-plastic products, like dishes and spoons, and novelties, including bar accessories often used on tables.

First, how much do retail buyers and sales people in department stores seem to know about the plastic products in use and on display in their departments?

The buyers, we would say, know as much as the manufacturers inform them—through salesmen, through advertising, through printed material enclosed with the product when packed.

The salespeople know less, naturally, than the buy-





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TENNESSEE EASTMAN CORPORATION (Subsidiary of the Eastman Kodak Company), **KINGSPORT, TENNESSEE**



ers. Too many—in each of the eight large stores visited—recognized handles or knobs or whole objects of plastics as “composition.” A few told us, as we approached them, that certain handles were Bakelite or Catalin. A few less knew that a cast phenolic handle would not break, chip or burn. And about the same number knew that a handle of a darker colored, less lustrous “composition” was more valuable than a metal or wood handle because it did not burn the hands of the person who touched it.

Naturally, the products about which the buyers and salespeople were best informed were the giftwares—electrical and non-electrical.

We felt that here lay, and lies, a great opportunity for the manufacturer. If he can provide a little more informative material—printed tags or folders for enclosure, small printed labels attached to the side or bottom of the object, or display material telling the advantages of his product—he will find a much greater recognition of the product's sales points, and probably an increase in sales.

Second, how are plastic products selling? In the lower price brackets—the kitchen cutlery, strainers and regularly used utensils, plastic handled objects sell for 15 to 19 cents retail as against wood handled objects at 10 cents. Yet the majority of sales go to the plastic handle because it is better looking, its color does not chip, rub off or peel; it is smooth and easy to handle; and it does not conduct heat.

Several factors determine the sales success of higher priced cutlery with molded or cast plastic handles for kitchen or table.

First is display. At Gimbel's is a display of Remington “germ proof” knives. Using the information which is applicable to any type of plastic handles (their non-breakable, non-chippable, non-burnable qualities) and the less commonly known fact that because of their immunity to weak acids, food will not decay if left on

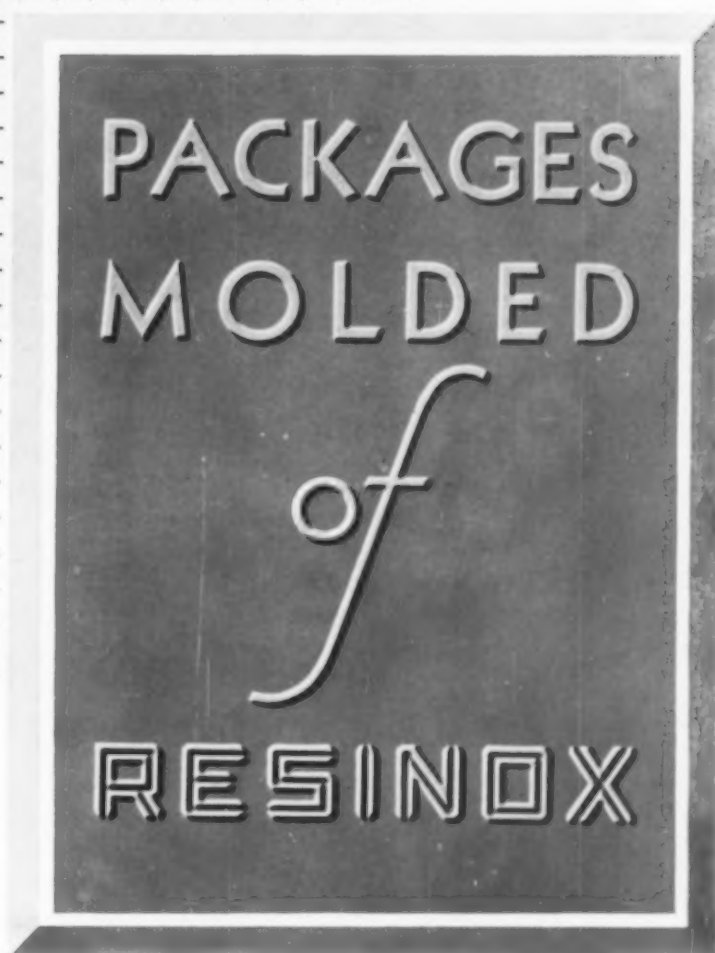
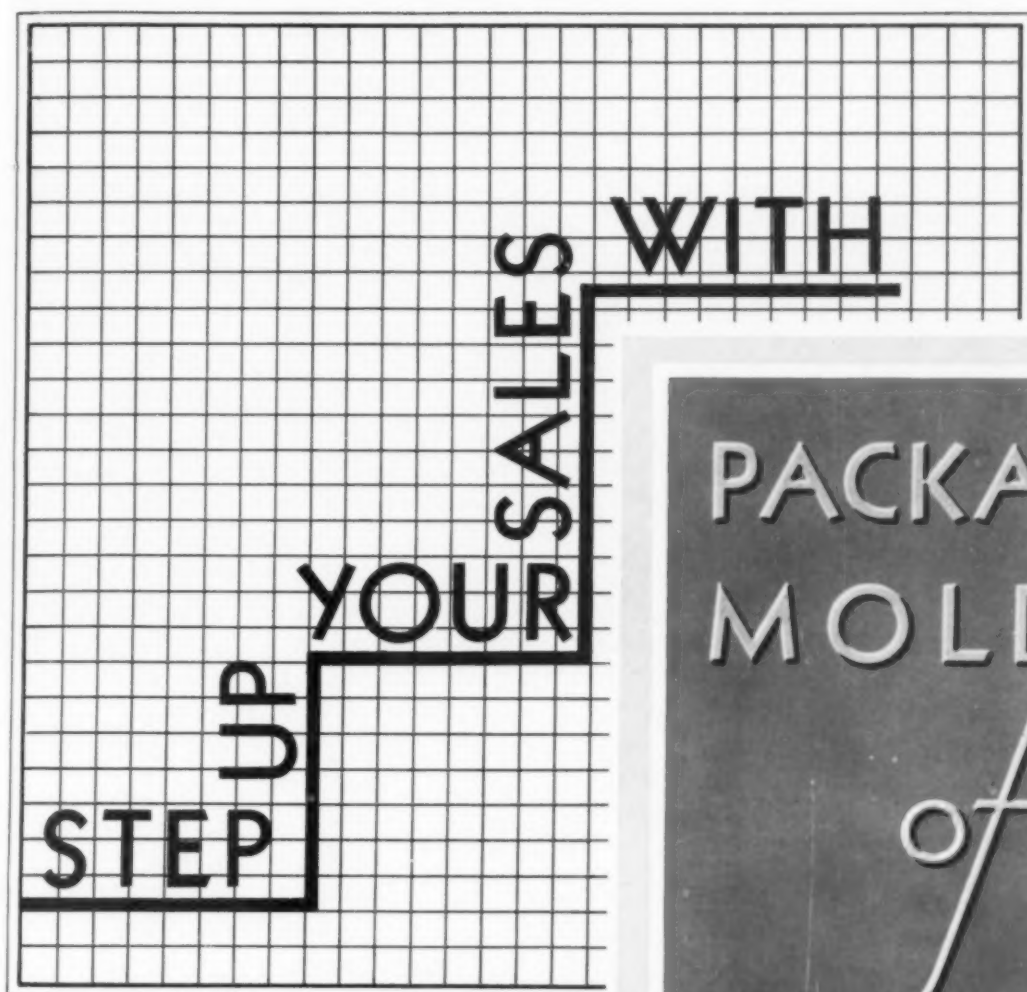
Four of a series of cocktail recipe novelties featured are Bloomingdale's. Both the bases and the figures themselves are molded of phenolic resins. The bases are uniformly black while the figures are of red or orange

them, an effective display has been arranged. The cutlery itself is good. Granted. But it sells at 35 to 50 per cent higher than wooden-handled cutlery, also with stainless steel blades. A carving or bread knife with a wood handle, for instance, sells at approximately eighty-five cents. The same size knife, with perhaps a slightly better blade, but with the “germ-proof” plastic handle, retails for a dollar and twenty-five cents.

The same effectiveness in display is a large determinant in the unusual sales of Russell stainless steel flatware at Macy's. Where other familiar lines of high quality flatware with plastics handles remain staple items because of their more or less prosaic display—in sets of six in the usual cloth-lined boxes—these sets far outsell them. The Russell set, mounted in velvet, is a complete table service including spoons for soup and for tea, salad forks as well as forks of regular size, serving spoons, serving knives as well as table knives—and the whole is set in a regular size tea tray of lacquered wood. The double advantage of a whole table service (available in open stock, if one wishes only certain pieces) and the attractive display probably play the determining role in the sales of this merchandise.

A similarly effective display helps to move the usually slow-selling two- and three-piece carving sets for serving fowl or roast. At Bloomingdale's a combination set of six knives and forks, with a three-piece carving set, is mounted in rich cloth in a flat wooden chest. The matching pieces sell faster than the sets separately. And the price for the whole ensemble is less than that of the knives and forks separately, with carving set extra.

Design and price play a larger part in the sale of chromium and spun aluminum or plain aluminum giftware than their plastic parts, (*Continued on page 50*)



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JANUARY, 1935

35

EUROPEAN DEVELOPMENTS IN THE USE OF PLASTICS

by Herbert Chase, M.E.

NO European nation can boast of a plastics industry comparable in size and importance with that in the United States, but there is much that American users of plastic products can learn from those in similar positions across the Atlantic. Americans were pioneers in the invention and utilization of the nitro-cellulose type and the phenolic plastics but from Europe came important developments in the urea plastics, as well as in some forms of cast phenolics and in certain other forms less widely used. In England there is a particularly well organized plastic industry and a great deal is being done there to promote the use of plastics of nearly every type.

An application of plastics which, so far as I am aware, has not been followed in this country is shown in Fig. 1. This illustrates a group of letter trays which are molded, presumably from phenolic materials, by Insulators, Ltd., London. These trays are made for the patentee, Quick Close Bags, Ltd., and are said to have had an enormous demand. They are available in colors and in effects made to simulate wood. As will be seen, they are furnished with a vertical support, arranged for clamping to the desk, and are so designed as to swing about this support or be quickly removed from it if desired. This makes a compact and convenient arrangement, as the contents of each tray is easily reached and removed. Unlike wooden trays, there is no applied finish to become

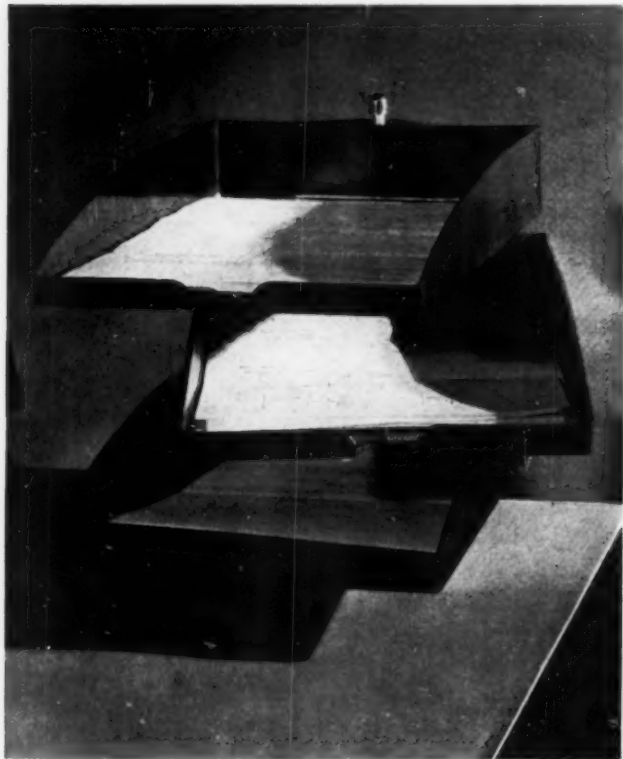


FIG. 1



FIG. 2

scratched or marred, for the trays come from the mold in finished form and with a luster that is permanent. There should be a good market for such trays in this country.

Although many mechanical parts are molded from plastics here, the housings for most electric drills are die cast from zinc or aluminum. The case for such a drill, illustrated in Fig. 2, is produced by Thomas DeLaRue & Company, Ltd., London. It is an intricate and sturdy molding but considerably lighter in weight than if made from metal—an important consideration in any portable tool. In addition, the two halves require no applied finish and serve as non-conductors of electricity. They are also smooth and pleasant to the touch and do not chill or heat the hand, as a metal grip would do under some conditions. Such a case is presumably made from shock-resistant material which is less brittle than common metal castings.

A somewhat similar product is molded by the same company for the Shadolite gun. This gunstock, shown in Fig. 3, is for a form of "rifle" in which no ammunition is employed. It is part of a slot machine, and when the trigger is pulled a luminous target shows the accuracy of the aim. A gunstock of this type is light, makes a fine appearance and, of course, will never corrode, whereas perspiration and handling would be certain to affect the finish on a metal or wooden stock. As in many other cases, such a molding provides ready means for mounting and enclosing supplementary parts without supplementary machining operations.

Although some work has been done in this country on the production of counter weighing scale cases from plastic materials, such cases, if they have been put into production, have not gained extensive use. A scales case is made up from three large moldings of "Elo" compound, a product of Birkby's, Ltd., Livers-

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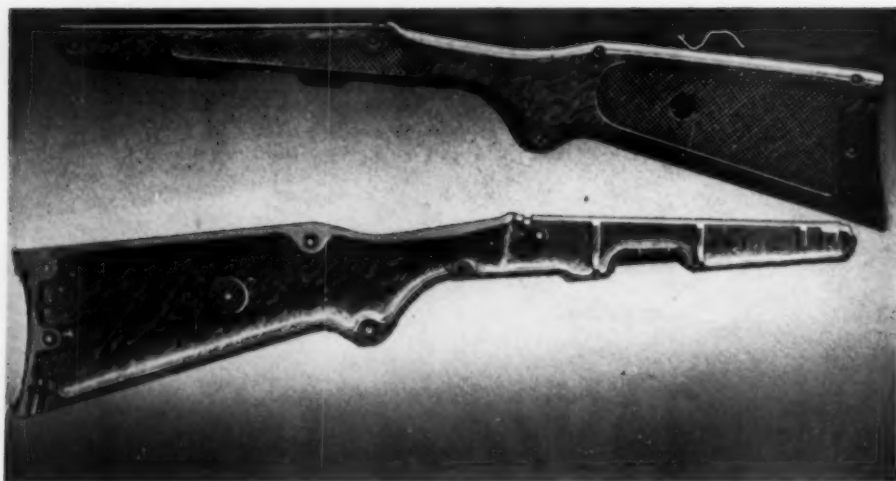


FIG. 3

edge, Yorkshire. This case, in common with so many British (as well as many American) products, is given a mottled effect to simulate some other material. This is often criticized as tending to cheapen the product or make it appear as an imitation of something "better." Artists generally agree that the plain natural colors available in all plastics are much to be preferred from every standpoint, especially as they lend a distinctive appearance and help to bring out the natural beauty of the plastic rather than tending to make it look like something which it is not. In any event, a scales case molded in plain colors would present a fine appearance and would never require refinishing, be easily cleaned and would be much easier to move about than a scale with a heavy metal case. The case referred to is 18 in. high, 15 in. long and weighs only 4 lbs.

A different class of product is the lampshade shown in Fig. 4, made by the Streetly Manufacturing Company, Ltd., near Birmingham, England. This is of translucent material and the piece is chiefly noteworthy because of the decorations (which are applied by a



FIG. 4



FIG. 5



FIG. 6

patented transfer system) that are said to be permanent. Much is expected from this system of decoration, as it makes available a variety of colored ornamentation which is considered essential on some lines of goods. It is expected to help in making the urea plastics more effective competitors of glass and china in dishes and other applications where the translucent plastics are gaining ground.

Another type of decorative product which is being revived in a new form in England is a hair ornament based on similar

head decorations worn in old Spain and Russia. Some of the modern plastics are excellent for this purpose and a fine example is the "Bexoid" head dress shown in Fig. 5. This is hand carved from the material named, which is described as "non-flame celluloid" (presumably cellulose acetate) produced by the British Xylonite Company, Ltd., London. The three lines forming the pointed design are inlaid with paste diamonds which, of course, make the piece highly effective.

Although the cast phenolic materials are quite extensively used in England, they are not yet manufactured there but are imported chiefly or entirely from Germany. Partly for this reason, perhaps, they are not yet employed to the same extent, relatively, as in this country. Cast phenolics are used in the umbrella and stationery trade and in the cutlery trade for fancy knives and tea knives, but not yet in dinner knives, where celluloid is preferred.

As in the United States, the English chain stores, corresponding to the American five and ten cent stores, sell a wide variety of plastic articles including tumblers and dishes produced from urea (Continued on page 52)

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WHICH PLASTICS TO CHOOSE? V

This is the fifth in a series of articles describing the various plastics and telling about their applications. Previous articles dealt with the phenolic, urea and cellulose acetate types of plastics and the cast phenolics. Subsequent articles will deal with other types of plastics, each of which has important industrial applications

PYROXYLIN—THE VERSATILE PLASTIC

by Herbert Chase, M.E.

PYROXYLIN PLASTICS have undoubtedly hung up more "world records" than any of the numerous plastics available today. This is partly because this type was earliest in the field and partly because it combines a large number of excellent characteristics, some of which are unique. Despite the inroads made by some of the less expensive plastics, the pyroxylin form still ranks first by a large margin (according to the latest census figures available) in the value of output (assuming that rubber is left out of calculations) and in poundage is second only to the phenolic types. Nearly eight million dollars worth of pyroxylin plastics were produced in forms for further manufacture in 1933, and the producers turned out another four million dollars worth of finished pyroxylin articles, exclusive of photographic film. In poundage, which approximated 13 million in 1933, the output is approximately half that of phenolic-resin materials.

That the pyroxylin plastics lead in versatility of application will hardly be denied when it is realized that the makers estimate the number of uses at about 25,000! This is partly because this remarkable plastic material can be worked in so many ways. It is also available in an infinite variety of colors and patterns ranging from clear transparent water-white material, through delicately colored clear and translucent effects to solid opaque colors and the blackest of blacks. Besides the solid colors, some forms can be had in mottled, striated, checkered, clouded, pearl and other effects. In addition it is possible to substantially duplicate, in appearance, wood grains; many of the natural minerals such as marble and agate, various jewels, as well as bone, ivory, shell, amber and many other products of Nature.

Add to this the fact that the pyroxylin plastic is one of very few plastics that can

be printed and lithographed by well developed processes, and that it can be dyed readily by the fabricator, as well as easily cemented to itself and to other materials, and it is small wonder that the material has attained so wide a use and is employed in one or more forms by so many industries. It has become so much a part of our daily lives that it is taken for granted and its value is seldom fully realized.

Nearly 80 per cent of the pyroxylin plastics produced are made up in sheet form, and of these sheets a considerable proportion is in thin gages from 0.003 in. thick and upward. The remaining 20 per cent is about



A number of examples of pyroxylin cloisonne, in which the pyroxylin surface is applied over an embossed backing to achieve unusually beautiful effects. The objects in this photo are shown through the courtesy of the Gemloid Corp.



Illustrating the wide variety of effects possible when pyroxylin is used. Note the intricacy of shapes, the combinations of colors. Photo courtesy the Celluloid Corp.

three quarters rods (on a weight basis) and one quarter in tubes. Sheets and some rods are cut from blocks in which the plastic is made initially. Some rods and tubes are extruded, but another and very important form of the thin-wall type of tube is made from thin sheet stock which is first cut into narrow ribbons and then is wound in the form of a helix on a rod or "mandrel," as it is called. The edges are then cemented together so that the joint is almost invisible. Such tube is extensively used for fountain pen and pencil barrels and shows, of course, the same beautiful figuration which is often given to the sheet from which it is made. It is quite unlike extruded tube in appearance, because the latter, unless made in a single solid color, shows irregularly striated flow marks running approximately parallel to the tube, whereas the sheet stock and consequently the spiral tube may have any one of the hundreds of patterns in pearl and other effects which lend much of the beauty of many pyroxylin plastics.

Although virtually all pyroxylin plastics are first made up into sheets, rods and tubes, it should not be concluded that no molding is done with this form of material, for this is contrary to fact. Molding is done, however, chiefly from sheet stock, often cut first into strips or bars, but it can be done from round rods, or blanks cut therefrom, when this happens to be the most convenient form.

One of the great advantages of the pyroxylin plastics (otherwise known as nitro-cellulose) and sold under such names as Celluloid, Pyralin, Amarith and Fiberloid, is the ease with which it can be molded or formed when heated enough to become soft. This type of plastic is a true thermoplastic, that is, it becomes soft when heated and hard when cooled. Subsequent heating again softens the material, for it does not set permanently when molded as the phenolic and urea plastics do. When softened, the pyroxylin plastics



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flow readily and are easily shaped to practically any form. Although some parts that are rather heavy or that have sections of various thickness must be molded under heavy pressure, generally in hydraulic presses articles such as soap dishes and many forms of containers made from sheet stock and having about the same thickness at all points are easily formed in hand molds, especially if the sheet is quite thin. Thus many articles are made by first softening sheet stock by immersing it in boiling water; next forming it in a screw-type of hand mold, and then plunging the mold and piece into cold water where both cool. The piece sets and is taken out in finished form except for a flash which is subsequently trimmed off.

Besides being capable of molding under compression when softened by heat, a hot sheet or tube is readily stretched. Thus, if it is desired to cover a bar or tube of some other material with a thin sheet of pyroxylin, a pyroxylin tube is first heated in boiling water and then stretched over the bar or tube. Upon cooling, it shrinks tightly around the bar or tube and clings closely to it. In some instances a mandrel may be substituted for the rod or tube and the tube may be stripped from the mandrel after it has cooled. It may then be slipped over some other object, such as a fluted or tapered tube, to be covered by it. When subsequently

heated and cooled it shrinks tightly around the object to be covered.

Many objects are coated with a veneer of pyroxylin sheet by first softening the veneer in a mixture, such as one part acetone and two parts water, until it is as soft and pliable as a wet chamois. It is then stretched tightly over the object—a toilet seat, for example—and cemented at the edges. As the sheet dries out it stretches very closely around the object and again becomes as hard as the original sheet, but forms the adherent covering desired.

Still another method of forming sheet is by the process termed "blowing." In work of this kind, two sheets are clamped between plates or molds having cavities of the size and shape of the articles to be formed. Steam under pressure is then admitted to the space between the sheets. As the plates themselves are warm and the steam supplies more heat, the material is softened thereby and the pressure against the inside of the sheets force them outward into the cavities provided, pressing the sheets against the walls of the cavities so that they take on the shape thereof. At points between cavities the sheet is heated, but being held against moving by the press which holds the plates together, the two sheets adhere and virtually become one. When cool, the press is opened and the (Continued on page 60)



A few of the "25,000" applications. Practically every machining and finishing operation discussed in this article is used in the manufacture of one or another of the objects here shown. Photo courtesy the Celluloid Corp.

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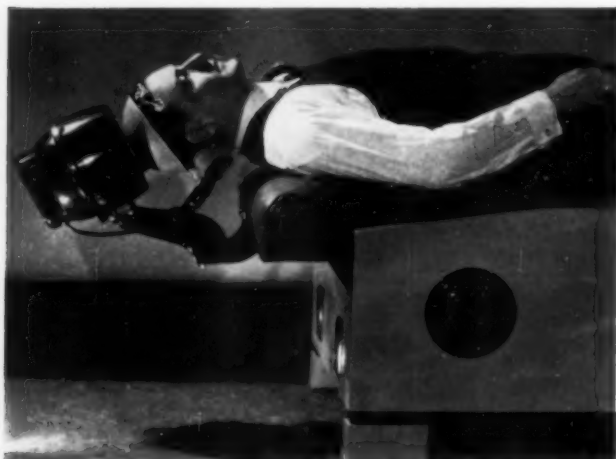
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NEWS AND DEVELOPMENTS

ONE of the largest orders for Micarta airplane pulleys ever placed, amounting to approximately 5000 units, has been received by the Westinghouse Electric and Manufacturing Co. from the Douglas Aircraft Co. The pulleys serve as guides for the control wires leading from the pilot's seat to the ailerons, rudder, elevator, wheel brakes, etc. Micarta pulleys are made of a phenolic material light in weight—approximately one-half that of aluminum—this material having wear-resisting properties equal to metal but eliminating the wear on wire which would occur in a metal-to-metal contact. Nearly 200 pulleys are installed on each transport plane alone.



An unusual utilization of phenol-plastics has been made by the Gro-Flex Corporation, which uses sturdy black moldings to hold the rubber massaging pads of their Gro-Flex massaging device. Photo courtesy of the Bakelite Corporation

Walker & Gilmore announce the removal of their laboratory from Plainfield, N. J., to 126 South 14th Street, Newark, N. J. The laboratory is fully equipped for testing and actual small scale production. At the same time, the firm has expanded to include a Design Service for its clients and it has engaged the services of Lucien Robert Horton as designer. Mr. Horton has been active in product designing for several years and was most recently connected with Bloomingdale's, New York City. Studios will be located at 444 Farmington Ave., Hartford, Conn. Mr. N. B. Sargent, formerly Sales Manager for the Garfield Mfg. Co., traveling from the New York office at 30 Church Street will cover the New England territory for Walker & Gilmore, contacting the department and chain stores and the various independent establishments as well as industrial accounts in the New England district. Mr. Sargent will also handle distribution in Upper New York State.

North American Rayon Corp. has published a thirty-two page booklet titled "Firsts in America," signaling the recent completion of their enlarged plant at Elizabethton, Tennessee. Profusely illustrated, in full color, the booklet presents notes as to significant initial industrial and commercial developments in this country, as well as an interesting delineation of the company's growth within the last few years. Copies may be had upon request to the sponsor.

Tornesit, the chlorinated rubber base from which paints, binders, adhesives and plastics can be formulated, is fully treated in an illustrated booklet issued by the Hercules Powder Company. The booklet, which treats of the chemistry and the applications of Tornesit, may be had on request to the Wilmington, Del., office of the Hercules Powder Company.

Interested parties may secure current numbers of **Monsanto Current Events**, house organ of the Monsanto Chemical Company, upon request to that firm. The publication, a thirty-two page monthly, in color, contains much information of value to the manufacturer, molder and user of plastics.



Cast metal was replaced by molded plastics in the fabrication of this Davis-Bovie foot-switch regulator unit, eliminating such production operations as grinding, sandblasting, phosphate finishing, scratch-brushing, japanning and baking. The use of molded-in inserts eliminated a number of drilling and tapping operations.

Photo courtesy of General Plastics, Inc.

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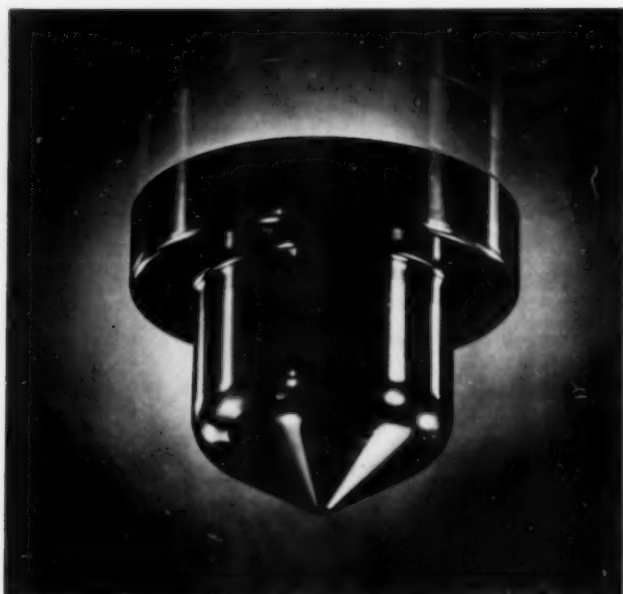
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An illustration of the rapid technical progress of plastic molding is found in this viscosity meter, molded by Norton Laboratories, Inc., of black phenol-resin. Although the molding involves some difficult draws, a smoothness of finish impossible a few years ago was obtained, as can be seen in this unretouched photograph. The meter is used with the small end down, the rate of flow through the small hole at the bottom being clocked for measurement. Photo courtesy of General Plastics, Inc.

The Editor

Sir:

The work which I am endeavoring to do for the plastics industry is the direct continuance of the initial development of its products. It involves less of the inventive element and more deduction from actual experience than the early work. The wizard is in my mind one whose functions are either not definable or not clearly understood. I know of no actual case where the first definition would apply, but most of us have more or less to do with the second as a handicap.

To me personally there is more element of wizardry in effective merchandising and designing than in chemical development, because many of their aspects do not seem to be subject to any exhaustive definition as are chemical and physical properties. I say this, although I am closely acquainted with one of the most successful industrial designers. However, the opposite appears to hold (as you also indicate) in the estimation of many managements. This is particularly brought out by such happenings as the one that has, for instance, recently befallen "Plioform." I mean to say that to any one who bothered to inform himself regarding the commercial requirements for plastic materials, the failure of this product as a molding compound was well indicated from the start.

Under the present general business conditions it is probably a better policy to develop present products to their fullest extent, rather than to introduce any new ones. Nevertheless, it seems that some foreseeing and financially capable firms should be getting their

lines ready for better times. Possibly it would be worth developing my views along this line more fully under some such heading as: the chemical engineer looks at the plastics industry.

Another idea which has been occupying my mind considerably may be of more value to you. The plastics industry as a whole could, no doubt, be helped a great deal by adopting uniform listings and certain standard tests by which a non-chemist could learn to determine the suitability of various materials for specific applications. The procedure, which is all too common at present, of obtaining bids on all materials and possibly having three or five manufacturers match the desired color, is a very wasteful one, both in cost and prestige. An effort to overcome this situation requires a degree of cooperation between competitive manufacturers and the real difficulty is, of course, to find a way of financing such an undertaking.

John T. Stearn

Pittsburgh, Pa.



In designing this chromium coffee service, Walter von Nesson specified phenol-plastic handles, molded by the Waterbury Button Company, both because of their utility as heat insulators and because of their ability to provide a pleasing contrast to the finish of the metal. Photo courtesy of Chase Copper and Brass Company

The Celanese Corporation of America has exercised its option to purchase a plant of the Celluloid Corporation at Amcelle, near Cumberland, Maryland, according to announcement made recently by Mr. W. S. Landes, President of Celluloid Corporation. Originally erected to supply the cellulose acetate needs of the Celluloid Corporation, the plant has been operated for some time by the Celanese Corporation under a contract to supply such needs and under a lease with option to purchase. The present arrangement provides for the necessary supplies of cellulose acetate to Celluloid Corporation for its increasing business.

MOLDED FITTINGS DISTINGUISH NEW-TYPE LUGGAGE KIT

Traveling case accessories have long been made of plastics, the most common material being pyroxylin. Now, however, The Diskin Rosenthal Corp. is marketing a new type of kit, utilizing a group of molded boxes and accessories. These thin-walled moldings were developed, in cooperation with the kit's manufacturer, by the Boonton Molding Company.

Among the advantages claimed for the molded fittings are greater strength, freedom from inflammability and freedom from color or texture changes, which sometimes occurred when previously used materials aged. The moldings are lighter than fittings of comparable size and strength made of metal and less expensive than the better grades of pyroxylin or than chrome-plated metal.



In planning the designs a keynote of simplicity was set, emphasis being placed upon utility throughout. As the set is designed for male consumption, decoration has been eliminated entirely, the makers relying upon color and texture to provide a pleasing and eye-appealing note.

Particular stress was laid, while designing, upon the provision of shaving-brush and razor boxes sufficiently large to hold the majority of brushes and razors, it having been found that many previous sets contained boxes of this sort too small to be really useful.

A study of current tastes in luggage-kit colors led to the selection of three as sufficient to cover the entire range. These are black, rosewood (termed mahogany by the molder) and a special color, developed by the Bakelite Corporation, matching natural ebony.

Materials, equipment and methods used in the fabrication of **PLASTIC PRODUCTS**

Here is a book explaining in detail how plastic materials are molded. Constitutes a complete, practical manual of up-to-date information needed both by the user and manufacturer of plastic products.

Plastic Molding

by LOUIS F. RAHM

Assistant Professor of Mechanical Engineering,
Princeton University

246 pages, 6 x 9, illustrated, \$3.00
Plus 25c postage.

THIS book describes the molding process and the characteristics of plastic materials. It takes up in detail the types and uses of molds, their style, general design details, the hobbing process. Then it gives definite information on operating equipment and discusses the selection of equipment and the layout of the molding plant. It includes careful suggestions on maintenance and operation of equipment.

If you are a manufacturer, you will get from this book help on all sorts of plastic molding problems. You will secure a manual of best methods.

If you are a user of plastic products, you will get from this book priceless suggestions for the more efficient selection and adaptation of these products.

The author has had wide practical experience through his connection with Du Pont Viscoloid Company and the Burroughs Company. Under the Robert Stewart Brooks Fellowship at Princeton, he made a survey of the methods and equipment of the leading molding plants in the country. His book is an authoritative manual for the entire plastic molding industry—the first to be devoted exclusively to molding processes, equipment and methods.

CONTENTS:

- I—The Molding Process and the Plastics.
The Molding Process The Plastics.
- II—Molds.
Types and Uses. Style. General Design Details. Special Details. Die Hobbing.
- III—Operating Equipment.
Molding Presses. Accessory Equipment.
- IV—The Molding Plant.
Plant Equipment.

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MOLDS BY NEW METHOD *

ACCORDING to information furnished by Process Molds, Inc., Fort Wayne, Ind., this company is producing molds by a new process which in some respects is quite the reverse of that commonly employed. The molds are reported in use for molding phenolic and similar plastics as well as for producing "blown" articles, such as toys and novelties, made from pyroxylin sheet.

Most molds for forming plastics are cut or hobbled by sinking a cavity or cavities into solid steel blocks which are subsequently hardened. This involves much expensive machine work and, if the surface of the piece requires lettering or other fine detail, considerable time and expense in engraving the surface. In an effort to minimize the cost and to produce fine detail without engraving the mold itself, the new process makes use of a pattern of the exact size and shape of the article to be molded. This pattern must be in a material which can be plated or must be so prepared that its surface can be plated with a special bronze. When a shell of this metal has been built up on the pattern (or on the article itself) to a sufficient thickness, the shell is stripped off and then forms a matrix exactly fitting the pattern.

As a shell of this description would not be strong enough to withstand much pressure without deforming, the next step is to cast additional metal (aluminum) alloy around the shell to give it adequate strength. This reinforced shell may then be mounted in a steel chase capable of withstanding the heavy pressures applied in the molding of most plastic materials.

It is claimed for the process that it not only reduces the cost of the mold materially, but reproduces fine detail, such as a fabric design—watered silk, for example—or a relief map, with great fidelity.

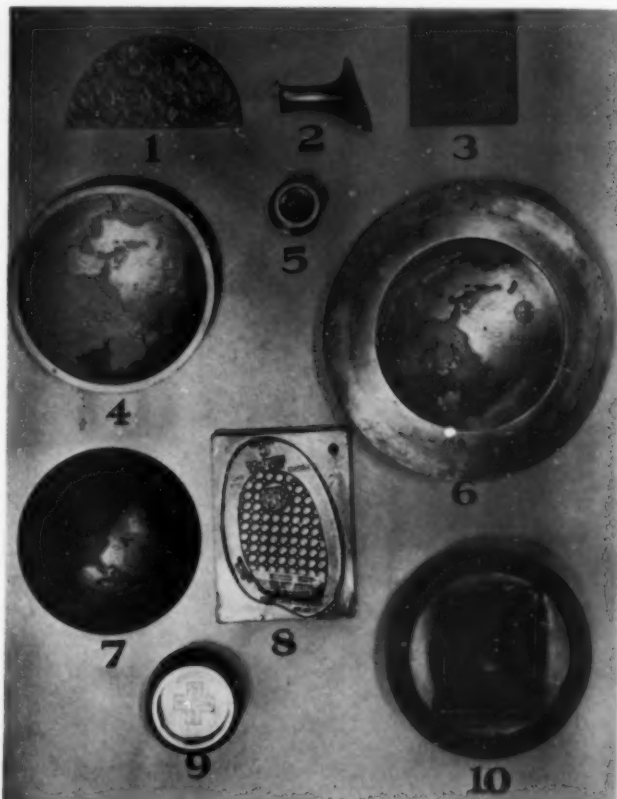
It is not essential to produce the entire mold cavity by this means, though in some instances this will result in considerable economy. Inserts such as those required for reproducing a complex trade mark, for example, can be made by the process and inserted in a steel mold made in the conventional way.

An accompanying illustration shows several molds

* At the present stage of development, the molds described in this article, while satisfactory for the running of samples, are not yet practical for production purposes.

Four important promotions in **Toledo Synthetic Products, Inc.**, were announced by James L. Rodgers, Jr., President, in conjunction with that company's annual Christmas festival. Horton Spitzer, in charge of New York headquarters since 1932, becomes vice-president. J. H. Jeffery, who has worked in laying out the constantly enlarging plant, is promoted to chief engineer and purchasing agent. Richard B. Harrison, foreman of production, becomes vice-president. Warren Feldtman, assistant treasurer, is made treasurer.

and parts. Although some of them are for producing parts in rubber, the majority are for molding phenolic articles such as sections of a globe with relief design, a vanity case and bottle caps. It is possible to make up sample molds quite inexpensively by this means and to use them for producing molded samples. In the event that the sample requires changes, a new mold may be necessary, but this will usually cost less than if a sample mold and alterations are required when the mold is made by the usual process of machining. Many molds, especially for thermo-plastics, are now reported to be in successful use.



Molds and mold parts made by methods evolved by Process Molds, Inc. 1—An insert for producing a watered silk design in part of a mold for phenolic parts. 5 and 9—Mold cavities for producing the molded phenol resin globe hemisphere. 7 and 4—An insert for the same or a similar mold for making the other half of the globe. 10—A mold for forming part of a phenolic vanity case having an intricate border design. The other molds shown are for the production of rubber objects.

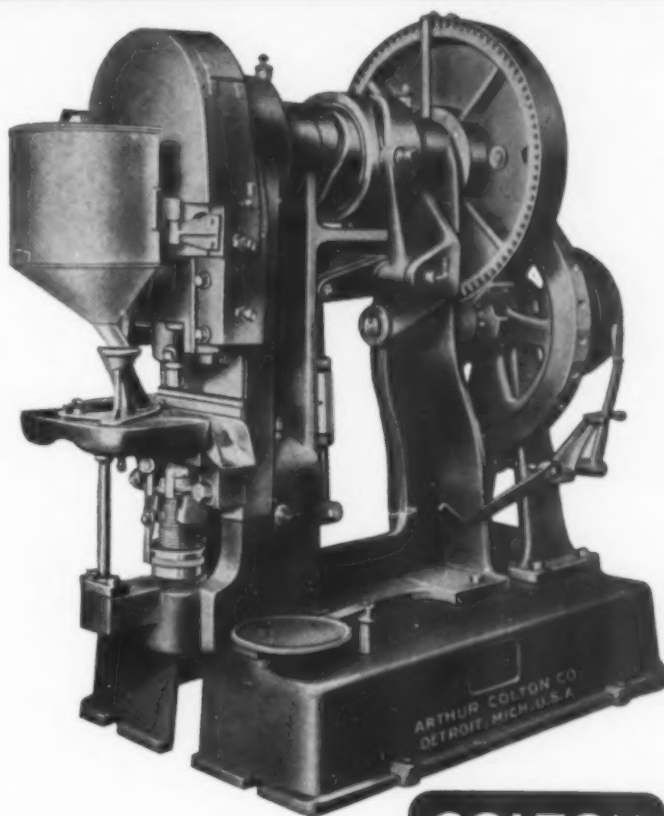
General Plastics, Inc., manufacturers of Durez synthetic plastic materials, has recently increased the capacity of their North Tonawanda, N. Y., plant by about 33%, by adding a new three story production unit to the existing buildings.

The Board of Directors of **Hercules Powder Company** on Wednesday, December 26, declared the regular quarterly preferred dividend of $1\frac{3}{4}\%$. This is payable on February 15, 1935, to stockholders of record February 4.

COLTON Preforming Machines have won wide usage because of their inherent sturdiness, their uniform, speedy and satisfactory performance.

Note the new, improved 5½ Tablet Machine shown at right. The solid steel frame insures perfect operation; the improved die fasteners, improved cam construction, heavier ejecting arm brackets and vanadium steel plunger make possible high speeds without fear of breakdown or lowered quality. In every particular, we believe, this machine is by far the finest the market has to offer.

The 5½ Tablet Machine makes tablets up to 3" in diameter and having a fill depth of 2½". Other Colton Preforming Machines—single punch, multiple and rotary—are likewise outstanding in construction and performance. Write for literature on these machines or have our engineers visit your plant—



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SUCCESS STORIES

(Continued from page 19) is made so that it unscrews and can be attached to a letter opener.

An idea of the care used in the design of all the Ink-D-Cator pens can be gained by observation of the following points: Barrels have a fine appearance, including a high luster and a graceful shape which fits the fingers well. The pen itself has a "golden chrome" point, carefully hand polished. Particular care is used in fitting a hard rubber sleeve and in setting the pen firmly against it. The ink sack is made of the finest rubber and is compressed by a recessed lever designed to insure a capacity fill.

Manufacture and Materials:

All materials are fabricated and the parts are assembled in the Inkograph plant under expert supervision. This involves many very delicate machine and reaming operations and great care in fitting those parts in which a proper fit means all the difference between excellent and unsatisfactory operation of the pen.

Three different types of plastic are used in some of the pens, in addition to the soft rubber sack, the glass tube and the metal parts to which reference has been made already. Most barrels and caps are produced from Celluloid tubing which is almost unbreakable and an excellent material for pen barrels. This applies to many of the black barrels and caps and to all those made from the beautiful pearlescent materials which are available only in pyroxylin plastics, as well as to the outer transparent section and the black necked portion between this section and the pen. Inside the latter is a hard rubber sleeve and fitting into this is the feed, made also from hard rubber, which fits in contact with the under side of the pen. These rubber parts are employed, as in most other pens, because of the close fits which can be maintained and because they are not affected by the corrosive inks which have a tendency to attack some forms of plastic.

The third plastic material, which is now being employed in some of the pens, is jet black Lumarith which is formed into finished size and shape by the injection molding process, a comparatively new method of forming cellulose acetate materials. In most respects this material is similar to the pyroxylin plastics, but, unlike them, it is substantially non-inflammable and lends itself readily to the process mentioned. This process substantially eliminates machining, since even the threads are formed by the mold.

Barrels made from pyroxylin are produced initially either in tubes or in rods. The former require plugging and threading and caps must be swaged to a point at the closed end. The extra operations on pyroxylin parts increase their cost, but since the pearlescent and other effects cannot be produced in injection-molded items, pyroxylin is selected.

Sales Success:

Subsequent to the production of the new designs, sales have increased substantially. This is attributable in

part to the new designs, incorporating the transparent gage section, and in part to a revision in sales methods. The latter involve, among other features, a flasher window display which dealers have employed and still use very effectively in promoting trade. An indication of the success met is the fact that, whereas less than a half dozen salesmen were formerly employed, chiefly in the area in and around New York, a staff of 25 salesmen is now used and national distribution has been attained.

"I COVER THE DEPARTMENT STORES

(Continued from page 34) we have observed. Color seems to be the main advantage of cast phenolic or urea handles: red for the familiar "cherry" or "rod" decorations on Manning-Bowman lines; blue for handles on G E urns and gift ware. The new West Bend cocktail shaker, of spun aluminum with a curved top tipped with a triangular red plastic piece, has a "collar" around the top, of black plastic and a base of the same.

Surely the smooth, non-peeling color, and the non-burning qualities of molded plastic handles have something to do with the success of the newest coffee percolator (a Chicago Flexible Shaft Company's product). The percolator, as slim and cylindrical as a cocktail shaker, has a two-sided, open-bottom handle of black molded plastic material. The small separate electric plate on which it heats has a "basket-handle" of metal with a similar black molded plastic grip.

Color and ingenious design largely determine the sale of novelties. Price also is an important consideration. And practicality as compared with existing products designed to serve the same purpose. In the case of the new all-molded combination cocktail shaker and pitcher, with six molded goblets and a chromium tray, the selling points are definitely the duplex use of the shaker-pitcher and the gay color combinations—black with red, orange or green, with chromium trimming and a chromium tray.

Still answering the question, "Are plastic products selling?" we move on to the field of articles made entirely of cast or molded phenolics.

Most of these all-molded or all-cast articles are still classed as "novelties." Take urea formaldehyde dishes, glasses, spoons. Such dishes, kept in stock by six out of the eight department stores visited (two stores handling no regular housewares and only a gift shop stock) are not yet accepted as competition for china on a large scale. Although extremely sanitary, lightweight and colorful, their easy-breaking brittleness is against their regular use. Available in dinner sets of porridge dishes, plates in three sizes, cups and saucers, cream and sugar pitchers and trays, it has only a moderate sale. Some of the larger stores have announced their intention of discontinuing it because of the difficulty of getting regular shipments.

One type of urea formaldehyde, painted gaily with a

likeness of Mickey Mouse, seems, however, to endure. Much liked by children, it is also to be found in "doll dish" size in the toy department.

Other novelties made entirely of molded or cast phenolics include miniature measuring spoons, in sets of four attached to each other with a metal piece; funnels, of various sizes; napkin rings; orange juice strainers; mayonnaise spoons; knife sharpeners (imported from England); nutmeg graters (imported from France); and, always, salt-and-pepper shakers.

The salt-and-pepper set in all-plastics has pervaded not only house-furnishing departments but gift shops in every Manhattan department store we know of. The familiar "Pierrot and Pierrette" type, one in a light color and one in a darker, and each occupying half a cylinder of space on a small round tray, are most popular. Made by the Ernest Sterner Company, they are new this season to the New York market. Sterner has another all-plastics model of round salt-and-pepper, with the pouring spout on one side. This we saw only at Franklin Simon. A dozen other varieties (two from England, with push-in cushion tops around which the salt trickles), a pair of glass shakers in a plastics base, and plain and weighted shakers complete the picture.

Novelties in drinking accessories, for bars, constantly keep arriving. The newest fad is that mounted cocktail calendar of small dimensions, of transparent red, burnt orange or black. Retailing at prices of sixty-five cents and a dollar, it offers a substantial profit to the dealer. Other bar accessories usable in modern homes include sets of corkscrew, bottle opener, and ice pick, with red or green cast phenol handles. A large number of stores, having purchased these 3- and 4-piece sets before similar gadgets could be purchased at Woolworth's at a dime apiece, still hold the sets, gaily boxed, at somewhere near a dollar. The gadget market, however, according to several buyers, is slow. It may pick up with "artificial stimulation" like advertising, publicity or display.

Yes, plastics are selling, in housewares and cutlery.

Consumer reactions to plastic materials are more unconscious than conscious recognition of their attractive colors, smooth finish. And because they are not expensive, they seem to be gaining quantity acceptance.

What helps would the dealer or retailer wish from the manufacturer, if any? "More information," is the unanimous report. "Information so simple and graphic that our sales girls can understand and remember the main points easily," says the buyer for Hearn's housewares. "No tags," says Macy's housewares' buyer. "They get torn off in the unpacking." "Stickers, seals and folders," says another buyer. "Display cards," says a fourth. And suggestions and materials for display.

We would say that the sales of molded plastic products for housewares, particularly tablewares and cutlery, have climbed to date. What they will do in a more rapid growth in popularity depends entirely on the cooperation between manufacturer and retailer in merchandising and promoting them.



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Flat work need no longer be dreaded with this accurate, quick and convenient means of checking temperatures. When molds are hot enough you know you are fully curing. When they are not too hot you likewise know you are getting uniform color. The modern Plastic Plant requires an accurate and dependable means of checking mold temperatures... The Cambridge Mold Pyrometer.



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The moulded part can only be as good, as accurate, and as neat in appearance as the mould is made. All our moulds are made in our own well equipped tool room under our strict personal supervision—which assures our customers of moulded parts of the highest quality at reasonable cost.

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EXHIBITION DEMONSTRATES PLASTICS' VERSATILITY

(Continued from page 25) possibilities. But, as a compensating, encouraging factor, the queries also demonstrated a decided public willingness to accept plastics, of every sort, not as novelties but as "true" materials, to be considered on their merits on a basis of cost, practicability, appearance and utility.

MODERN PLASTICS has, since its inception, striven to eliminate the factor of ignorance and to foster that train of thought which looks upon plastics as a group of materials worthy of the best uses which industry can devise. To this end, it sponsored the first Plastics Exhibit. To the same end, it pledges itself to continue—at frequent intervals—to sponsor these group demonstrations of the industry's achievements. Secure in the knowledge that plastics manufacturers and fabricators will provide it with the material for another such demonstrative exhibit, MODERN PLASTICS looks forward with pleasant anticipation toward the Second Annual Plastics Exhibit.

White and light-colored Durez molding compounds, said to be odorless, tasteless, non-fading and highly resistant to moisture, will soon be added to the line of Durez synthetic plastic materials offered by General Plastics, Inc., it was learned with the issuance of U.S. Patent No. 1,985,870. The patent grant covers the production of light artificial resins from cyclopentanone, and it is understood that a new process for the manufacture of cyclopentanone had to be developed by General Plastics before the new resins could be produced, since it was not heretofore produced in commercial quantities in this country.

EUROPEAN DEVELOPMENTS IN THE USE OF PLASTICS

(Continued from page 38) plastics, as well as combs, hair ornaments, brush parts and the like made from nitrocellulose and cellulose acetate. For wiring devices, heater plugs and numerous other electrical items, the molded phenolics serve as in this country. Some parts of this character are seen in the hot water jug, Fig. 6, in which the lid and insulating parts are molded from black and colored plastics by the Lorival Manufacturing Company, Ltd., London. This jug contains an electric heating element for warming the contents.

In England, the casein plastics maintain a more important position, relatively, than they hold here, although in the United States the button trade still employs casein extensively. Handles for umbrellas, knives and brushes, pen and cigarette holders, piano

keys and the like are among the articles made from casein, though there are competing materials for the same and similar uses.

Another recent development in England is the manufacture of stereos from plastic-covered blocks under a process invented by E. S. Hole of the Holite Press, London. A laminated plastic called Holite is pressed against an original heated half-tone or line cut to form a matrix. The matrix is then placed in a hot press and covered with synthetic-resin bonded Holite sheets to form an exact duplicate of the original. Blocks having screens as fine as 175 are reported made with success and four-color plates are produced in the same way.

Considerable progress has been made in England and Germany in so-called "injection" molding with such substances as cellulose acetate, benzyl cellulose and, to a limited extent, with certain styrol plastics. All of these materials soften under heat and, when in liquid form, may be forced under heavy pressure into molds where cooling and consequent solidification takes place. In principle, the process is much the same as die casting with metals, except that lower temperatures are used, and, of course, special machines, designed for the purpose, are employed. The product is much the same as when molding from powders of the same material, but for small parts, the molding can be done with great rapidity and consequently at low cost, so far as labor is concerned. Parts such as pen caps and barrels, very small boxes for pills, small spools and other parts used in electrical work, and like products are now produced in large quantities by this method.

All of the materials used for this purpose are rather expensive, as compared to the commoner synthetic resins but they all possess great beauty and certain other good qualities, such as high dielectric strength and low moisture absorption, and are excellent for certain purposes.

NEW IDEAS IN PLASTICS

(Continued from page 28) in many other molding compositions, and when a carefully purified lecithin is used, even chocolate becomes a "plastic" in that its molding properties for candy manufacture are much improved. (Werner Esch, Gummi-Zeitung, Vol. 48, pp. 899-900.)

A new phonograph record, with superior sound reproducing qualities, and with advantages in molding behavior, is made of a blend of vinyl resin and a cellulose ester plastic, for example, polyvinyl acetate and cellulose acetate. (Willy O. Herrmann, Chemische Forschungsgesellschaft m. b. H., U. S. P. 1,983,030.)

ELECTRICALLY conducting shapes, with the lead-in wire molded in place, have superior properties if made of a fine metal powder in a resinoid bond,

Ameroid

CASEIN PLASTICS

SHEETS and RODS

- Non-inflammable
- Made in beautifully mottled and plain colors

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molded in such a way that a saturated gaseous atmosphere is held in contact with the shapes during the molding operation. This is accomplished by packing the green shapes in a fine inert powder; thus the gases evolved at the molding temperature can escape only by slowly diffusing through the packing, and each piece is surrounded by the gas throughout the operation. Thus resinoids have solved another problem in the electrical field. (T. C. Browne and E. Brugmann, U. S. P. 1,983,267.)

RAYMOND LOWEY TELLS WHY

(Continued from page 23) in common every-day service will become equally curious to see, and we will marvel that they were ever used for national transportation."

In the current exhibit of Industrial Art at the Metropolitan Museum, Mr. Loewy demonstrates his fondness for plastics in designing, with Mr. Lee Simonson, an ideal office-studio for an industrial designer. The walls are of ivory colored plastic for its cleanness and the fact that this efficient material does not burn nor depend upon frequent refinishing for its continued freshness of appearance. Around two of the walls are built-in cabinets of the same material and of the same color as the walls. The tops of the cabinets are of blue-gray plastic. The hardware is gunmetal. The unique clock has a face of blue mirror, hands and rim are of red-gold, and the numeral marks are peg-shaped pieces of ivory-toned plastic. This exhibit pays high tribute to plastics and becomes unique among other exhibits through its use.

Mr. Loewy is one of the least publicized of the contemporary designers, and one of the greatest earners. He is native Parisian. Graduated from the University of Paris as an engineer. Served his country in the war, was wounded and decorated. He came to this country in 1919 and strangely deserted his engineering background for art. His fashion drawings and covers for Vogue, Harper's Bazaar and Butterick publications gained notable attention.

The opening campaign of advertising for Saks-5th Avenue was of his design, as was much of the White Star Line advertising of that time. He designed windows for Bonwit-Teller, and underwear for Kayser. Then he decided to take advantage of his engineering knowledge and, in 1926, designed the exterior and interior of the Hupmobile of that year.

This was his first actual entrance into the field of industrial design, and Hupmobile has retained his services ever since. He uses plastics freely in the construction of Hupmobiles, especially for decorative motifs where simplicity is desired, and for all controls and hardware handles. It is never cold in winter nor sticky in summer, he says, and people like it. Besides, it gives a feeling of quality and appearance of luxury which adds little or nothing to the cost

He cooperates in design with the engineers of Westinghouse, Standard Oil of New Jersey, New York Central, Pennsylvania, Sears, Roebuck & Co., Shelton Looms, and many others about whom he is reticent to talk. Among other activities of the moment, he is redesigning the entire line of packages and containers for a well-known brand of cosmetics.

His one sad experience with plastics was an ice cube tray designed for electric refrigerators. "I thought it would be fine," he says, "and chose a pleasing shade of blue to suggest coldness. The public didn't like it, however. It didn't go. It was just a flop. It must have been the color—it couldn't have been the material," he grinned.

FOR THE STYLE MARKET

(Continued from page 20) amels having been marketed.

It was discovered, however, that this procedure had its limitations. Each item required tools and jigs which, in the event of a style failure, had, of necessity, to be discarded. The enameling process was slow and, comparatively, expensive. Finally, enamel in large surfaces, was subject to rapid deterioration—slight chipping being sufficient to make the merchandise unsalable or, if already sold, being sufficient to cause acute consumer dissatisfaction. With this condition in mind, the company cast about for some material that would provide equal or greater beauty while simultaneously affording greater permanence and greater ease of fabrication. They soon discovered the cast phenolics, rechristening Marblette as Evanite.

Immediately their fabrication problem was simplified. Their own metal working machinery could be used for this new material. Many shapes could be fabricated by the simple process of cutting sections from rods or tubes. Color variation, once requiring a separate enamel run, was now possible merely by the substitution of one color of stock for another on the saws or lathes. Assembly was likewise made easier—for cast phenolics could be drilled for screws with a minimum of effort and could, where necessary or desirable, be easily cemented.

Certainly then, cast phenolics offered decided manufacturing advantages, not the least among which was their speed of fabrication, the low point to which they permitted the keeping of stock and simplicity of their machining and color varying operations.

What did they have to offer in the way of style, beauty, design? Here the continuing rising curve of the company's sales is a quick indicator. Evanite has hit the market and dealers and consumers, both, have liked it, purchased it and found it good. Since these are quality products, selling for a good price, it is possible to do considerable hand polishing, finishing and assembly. Yet, in cases where price limitations preclude such extensive work, the cast phenolics still fit in. Slight simplifications in design often make extremely low cost production possible even when the advantages of quantity output are absent.



Globe Design by Ianelli Studio

Base Design by Barnes & Reinecke

A NEW WORLD

Trans-oceanic airplane flights and short-wave radio broadcasts bring need for a world globe in every office and home.

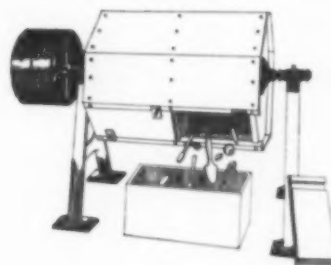
To meet this need, Rand McNally & Co., the largest makers of maps, atlases and globes in the world, offer this Silver Chrome Globe with Bakelite Molded Base.

This globe is technically correct in every detail and is securely mounted on an attractive Molded Base of either black, mahogany or walnut Bakelite.

A Molded Base was chosen because of its lightness, strength and beauty—because it harmonizes in texture and quality with the Silver Chrome Globe and so lends eye appeal with resultant greater sales.

Our engineering design department is ready to cooperate with you on your problems of re-design for bigger, better sales.

CHICAGO MOLDED PRODUCTS CORP.
2146 Walnut Street Chicago, Illinois



USE BARREL FINISHING

for the most perfect, economical polishing of—

**CELLULOSE ACETATE
• HARD RUBBER • PY-
ROXYLIN • PHENOLIC
PLASTICS • CATALIN •
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Applies a lasting finish; eliminates buffing. Write for particulars.

Equipment Methods Formulae

RUDOLPH R. SIEBERT
183 ST. PAUL ST. ROCHESTER, N. Y.



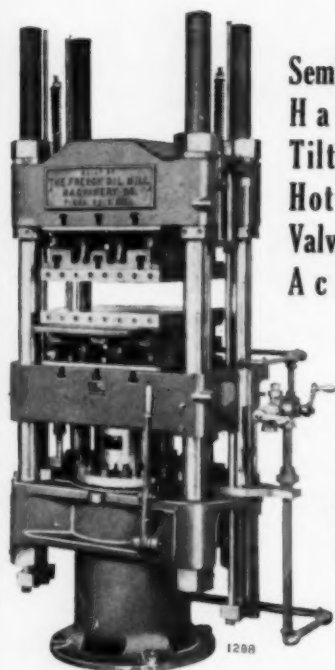
..... that molded control knobs, for all kinds of apparatus, are rapidly replacing metal and fibre. As we make them, at the Diemolding plant, they are stronger, longer lasting and of better appearance than those formerly used. Frequently it is possible to treat the shaft as an insert, thus reducing assembly operations and insuring permanent unity between shaft and knob. As heat and electrical insulators, molded knobs, of course, have no equal.

Just one instance of the type of thinking and the type of molding that is done at Canastota.... the point of this ad being, "When you want a well planned and well made part or product.... consult—

TRADE **M** MARK

DIEMOLDING
CORPORATION
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Semi-Automatic Presses
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Valve Control Pumps
Accumulators

Molding Presses of
all sizes and types
for all compounds

The French Oil Mill Machinery Co.
Piqua, Ohio

MERCHANDISING IN MILLIONS

(Continued from page 17) closures are not the least of such improvement. In one store, we counted twenty brands of toilet preparations using plastic closures in preference to other materials. If there is any doubt in your mind, just drop in some day and see how these little bottle caps and containers of plastics stand apart from their brothers and sisters of other materials.

On the next counter we find toilet sets of plastic. Brush, comb and mirror, of soft pastel colorings—some inlaid, some plain—all packaged in satin lined boxes at 25 cents and 50 cents complete. There are sets for children, and for adults. Then, there are combs and hair-pins. Dozens of styles of each. Hundreds in stock in each store. Millions throughout the country. Good-looking, practical and useful, and all made from some sort of molded material.

We will skip the handkerchief department. Handkerchiefs are better when made from softer materials than plastics.

Pocket knives come next. Imitation pearl is still used for handles on these useful little implements, but so are plastics—many of them. Fountain pens are quite universally molded, and most of them from what we popularly call plastics. Twelve styles in one store, sixteen in another, gives an idea of the variety, but no one with whom we talked would venture to estimate the number of pens sold yearly through the chain stores. Millions is not a guess, it is a certainty.

This "Voyage of the Aisles" was made during the Christmas rush, and notable among special Christmas things made of plastics is a neat little electric base-unit for connecting several strings of Christmas tree lights. Through it, one long cord connects the whole tree lighting ensemble to the wall outlet. Other electrical equipment, sockets, switches, plugs, electric-iron and percolator connection plugs, are much too well-known to dwell upon, but they add their millions of sales each year and constitute an important market for many molders. Better design is also apparent in this department.

Candle holders of green phenolics, inlaid with red holly leaves, were ready and willing to hold holiday candles for those who want them, and there were others of staple colors—black and red with metal inlay, for year-round occasions.

Plastic ash trays are gaining in both sales and favor. They do not burn nor corrode, are easy to clean and are light and convenient to use. They do not break easily and are inexpensive. But just because they are cheap, it doesn't necessarily follow that they are produced in hit or miss fashion. One manufacturer, we were told, recently spent more than six months designing, experimenting and redesigning a new number which is scientifically correct, and fool-proof to use. The cigarette rests are so constructed that it is impossible for a burning cigarette to fall off the rest (unless some one knocks it off) even if it burns itself completely out. Dropping ashes fall into a sloping trough leading

to a hole in the center which is of the proper size to automatically extinguish an inserted cigarette without smoldering. Such planning paves the way for satisfied customers and increasing sales.

It took some time to worm into the jewelry department where we found molded and fabricated plastics holding the center of the stage with many useful and decorative items. Bracelets, clips, buckles, pins and rings are well handled and reasonably priced. We bought a few pieces and they are pictured here.

We showed the flexible red bracelet to a young lady who is familiar with our prowlings in factories and shops, and asked her to guess the retail price. She slipped it on her wrist with evident admiration, cocked her head on one side, and guessed badly, "Dollar and a half."

Believe it or not, it cost twenty cents, plus one cent tax.

A nail brush with plastic back and handle of unmistakable Japanese influence in design is also shown. It was made in Japan. The powder box, illustrated, is a two-color, two-piece example of attractive design and, with its mirrored top and velvet puff, is an outstanding value at 10 cents. We picked up two little plastic frames; one, an imitation of those of the Empire period, the other is self-supporting, has a mirror back, and is distinctly modern. Both are illustrated.

More than half the buttons sold in chain stores are made from plastic materials of one sort or another.

Now, we come to the kitchen departments where plastics seem to be right at home. Knives, forks and spoons of stainless steel sport gay handles of molded materials. There are bottle openers (illustrated), serving trays, soap-dishes, bath room tumblers and holders, flasks with plastic closures and almost every manner of dish from children's feeding dishes to complete picnic equipment. Light, gay colors predominate, and a steady all-year demand is greatly accentuated during summer months.

Leaving the chain stores for a moment, let us look in on one of the factories where some of these novelties and dishes are made.

The plant is a model of engineering precision and efficiency, and more than eighty thousand finished pieces of molded plastics pass through daily. We are told that the real volume of business is done with 63 items with an average of four colors each. This means that 252 items are constantly in stock in sufficient quantities to meet every demand from a 1½-oz. tumbler which retails at two for five cents, to special sets of Mickey Mouse dishes which retail at \$1.50. There are five divisions of products on which this company is concentrating at the present time.

Children's dishes include feeding mugs, feeding dishes, cereal bowls, flat plates and deep bowls, as well as those decorated with members of Walt Disney's Mickey Mouse family in the higher priced molding material. A special etching process has been developed (and patent applied for) by this company for this deco-

PLASTIC MOLDING



Producers of the
finest in molded parts
for over forty years



SHAW INSULATOR CO.
Irvington, N. J.



Northern
INDUSTRIAL CHEMICAL CO.
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11 ELKINS ST. So. BOSTON

Plastic molding in various materials for mechanical, electrical, container, and ornamental purposes. Attractive colors, permanent good appearance, durability. Moderate cost. We will cooperate in development of design and in technical features.

* Illustration above shows sample book cabinet produced for The Holliston Mills, Inc.

STANDARD TABLEWARE

Complete line of Beetleware and Bellware in various colors.



STOCK BOXES

in various sizes and colors. Write for samples.



When you call upon **MOLDING TO AID YOUR SALES** think in terms of **BETTER DESIGN AND BETTER MOLDING**

Molded re-use packages, closures and displays are the fashion today. For one successful Luxor package, there are half a dozen ill-conceived failures. Yet packages, like molded products, must be properly designed, expertly molded if they are to catch the eye and make the sale.

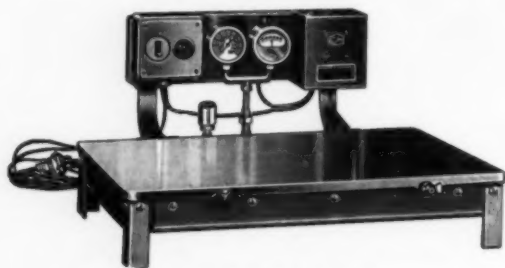
Kurz-Kasch offers a long record of design and molding experience... most of it in the very field you work in, to supplement the advantages which our clients find in Kurz-Kasch equipment and Kurz-Kasch nationwide service. Investigate!

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No. 1 Electric Steam Table

Vaporizing Machines . Dies . Tools . Molds
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STANDARD TOOL CO.
73-75 WATER STREET
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ration, whereby the inks or dyes used for coloring becomes a permanent and homogeneous part of the dish itself and cannot be washed or scratched off in use. This is highly important when one considers that youngsters eat many meals from these colorful little dishes and every precaution must be taken to safeguard their health.

This manufacturer advertises his ware as being made of non-fragile plastic material. Strong—durable—especially suitable for children's use. Odorless, tasteless and will not taint foods. Luncheon sets are also included in this group and comprise cups, saucers, plates, sugars and creamers, and peppers and salts.

New pastel colors are being introduced which unfold a new world of opportunity ahead. The strong deep colors previously available lacked daintiness which mark the chief virtue of these new pastel shades.

Then, there is the kitchen group of scoops, funnels, measuring spoons and cups, orange juice strainers, and bathroom tumbler holders with tooth-brush racks—or without the racks, for kitchen use. The tumbler group includes standard shapes and sizes for all occasions. They are made plain or decorated. Among the more popular, are the iced-tea, and orange juice size, and even these share their popularity with the "Jester Set," which is a whole flock of whiskey tumblers nested with a convenient cover.

The novelty line includes decorated trays, sewing boxes with internal divisions to separate small wares and tight fitting covers, stocking boxes, powder boxes and vanities.

A new toy line is the most recent addition and delighted the hearts of many youngsters for the first time this past Christmas. There are toy dishes, toy sets, Mickey Mouse items galore including cunning little lamps for the nursery which are shatter-proof in case Junior decides to try to take one to bed with him and drops it enroute, and there are sand dishes and trays as well.

Inventory, in a plant this size, is no small chore, and a control board has been developed which handles it admirably and cuts back-orders, or short shipments to a minimum. A single glance at the board tells the in-stock condition of any item instantly. Little red flags warn of low stock on any item. Other colored flags indicate full stock, overstock or low. It is a permanent inventory deluxe which simplifies production control and helps maintain the standard of service necessary to supply more than two thousand retail stores, as well as jobbers and premium users, with the merchandise they want when they want it.

What do chain store executives think about the future of plastics?

We asked some of them, and here are a few of the answers.

One executive volunteered the information that merchandise made from plastic materials has created its own market, and that the future growth of this market is favorably indicated. "Much more of the material

undoubtedly will be used," he said, "as additional articles of practical nature are developed and introduced. But, as in all merchandising, it is essential that manufacturers and retailers keep abreast of the times. New items must be introduced frequently. New shapes and new designs are needed to maintain public interest. This not only applies to plastics but to all merchandise from whatever material it is made.

"Plastics present a pleasing and permanent finish which cannot be underestimated in the low-price merchandising field. In their present stage of development there is little loss or dissatisfaction. Some very real improvements recently have been made."

"Public acceptance and appreciation," said another executive, "can best be gaged by the quantity of any merchandise it buys, and many million articles made wholly from plastics are sold yearly in our stores. Additional millions of items which have plastic closures, handles or other integral parts where this material has improved both the appearance and utility of the item, find ready sale."

Another executive, from another chain, spoke freely about the quality of merchandise being turned out today. He points out that his company does much of its own designing and development work in conjunction with well established manufacturers and that every precaution is taken in the matter of plastics to use only those materials suitable to the purpose for which they are chosen. Formaldehyde, and other impurities, are carefully avoided wherever dishes or food containers are concerned. He believes there is a tendency afoot to produce plastic goods too cheaply. He specifies dishes, and says their present thinness detracts from their utility and prevents more general acceptance and use. "Original imports," he continues, "were 25 per cent heavier and stronger than most of those in today's market, and even a very slight difference in weight makes an article either a hundred per cent more useful and lasting—or a hundred per cent worthless."

Executive offices of other chain store organizations are out of reach of your reporter at the moment, but the merchandise illustrated and described in this article has been gathered at random in stores of five different prominent chains and offers substantial evidence that many types of plastics are generously displayed and receiving their due share of customer attention. The fact that plastics have found such general acceptance in chain stores has helped, rather than retarded, their sale in department stores where plastic articles in the higher price brackets are found in abundant quantity.

The higher price bracket naturally permits a broader range of merchandise selection, and plastics may be combined with more costly materials to merit the price. Then, too, in many department stores, like articles are priced comparably with those found in the chain stores which can only mean that additional millions of plastic items are yearly finding their way into American homes.

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» *beauty* FOR DISPLAY VALUE

A-R-C PLASTIC-MOLDED

utility FOR SALES VALUE



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The two essentials for any product . . . beauty and utility . . . are assured in custom molded plastic parts, produced of modern plastic materials at the skilled and experienced hands of American Record Corporation's master molders.



Consult our technical, design and engineering staff for a solution to your plastic-molded problems.



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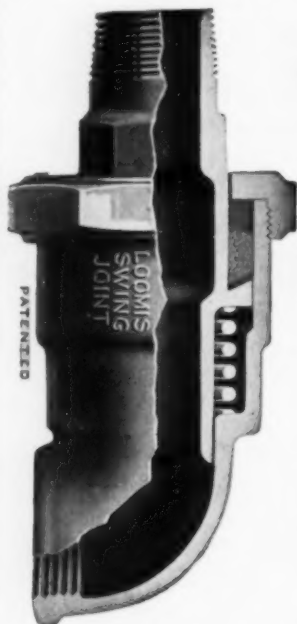
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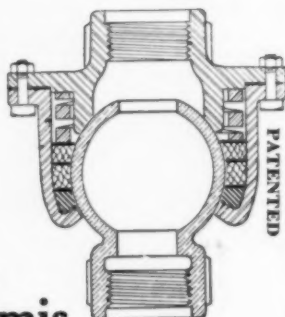
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WHICH PLASTICS TO CHOOSE? V.

(Continued from page 42) formed sheets are removed and cut around the hollow objects which have been formed in them. This method is used to form a large variety of objects, especially toys, baby rattles and the like. Pyroxylin tubes, to the inside of which steam is admitted, can be "blown" into suitable molds in the same way to produce shaving brush handles and similar hollow and seamless articles.

A large proportion of toothbrush handles are made from pyroxylin sheet cut into strips and lengths about the size of the handle to be made. These pieces are then placed in molds, usually with several cavities, mounted in hydraulic presses. When the latter are closed, the strips are pressed into the form of the cavities, the mold, of course, being heated and perhaps the strips preheated until nearly up to molding temperature. When the handle is formed to shape, the mold may be cooled and the handles ejected in hardened form. But since the alternate heating and cooling of the mold requires time, some automatic presses are so designed that the handles are ejected while still soft into a bath of cold water where they harden without material change in form.

In a similar form of molding in hydraulic presses, the material to be molded is first heated on steam plates, usually in strips or "slugs" cut to approximate size, after which it is placed in heated molds where it is formed to shape under heavy pressure. The mold is then cooled, often by circulating water through channels cut in the body of the mold, so that the moldings can be ejected without changing shape. Dentures, meter wheels, keys for business machines, some forms of costume jewelry and many other products are made in this way. Objects such as umbrella handles may be similarly formed, but are more often bent around forms by hand, starting with bar stock which is heated to make it plastic. The bar may be cut or slotted in a variety of ways, if desired, to permit of forming different elements in different ways. Engraving or carving is often done on products of this class, as the material is readily cut with many types of tools.

Brush backs, mirror frames and many other items that go to make up toilet ware and dresser sets are usually cut from sheet stock which is first blanked or sawn to the desired contour and is then shaped at the edges, routed, drilled for bristles and otherwise machined into the desired form. Such products are often polished by hand on suitable wheels or, especially in the case of inexpensive items, may be tumbled or dipped in solvent to produce a lustrous surface.

Combs and hair ornaments are made from sheet stock which is cut to shape and usually has the teeth slotted by machine. Molding is also done on some combs. Buckles, buttons and other decorative items for the clothing and millinery trade are either cut from sheet stock or from bar stock, buttons from the latter being produced in special automatic machines designed especially for this purpose.

Much sheet pyroxylin is used for automobile curtain lights, picture covering, small window openings and uncounted items produced by the printing trade in flat sheet form. A great deal of other thin sheet is formed into indexing items, price tags and many other products. An advantage of the material in this and many other applications is its flexibility and toughness and the fact that it is not easily shattered by a fall or other misuse. Exposure to sunlight, however, causes the material to become brittle in time.

Another form in which pyroxylin products are made is by the dipping process, starting with a liquid solution. Mandrels of the desired form are dipped into the solution and withdrawn, the material which adheres to the surface then hardening. Several dippings build up the wall thickness to the desired dimensions. Tubular containers of various sizes and lengths, and even a new form of collapsible tube is produced in this manner. Screw and other forms of caps are applied, and as the containers can be attractively colored and printed, they are very well suited for certain purposes.

Among the hundreds of uses not already referred to specifically may be mentioned musical instrument parts, hand-bag frames and covers, cutlery and similar handles, novelties of many forms, fishing accessories, drafting instruments, hardware parts, eyelets, collars, hat peaks, parts for games and sporting equipment, knitting needles, eye-glass and other optical applications, radio and other dials, storage battery parts, scientific instrument parts, watch and clock crystals, photographic film, X-ray mounts and many other related items. Many of the same and similar items are produced also from cellulose acetate which has similar properties and is made by many of the same producers who make pyroxylin plastics. In general, pyroxylin products are about ten per cent, or thereabout, less expensive than acetate, but the latter is quite slow burning, whereas pyroxylin in many forms burns rapidly or explosively and thus must be handled with care and usually stored (in quantity) in special vaults. Special precautions must also be exercised in machining, so that chips, dust and shavings are quickly removed to avoid fire hazard. In some cities special fire-department permits are required and special underwriter requirements must be fulfilled. These facts sometimes lead to the use of acetate in place of pyroxylin largely to avoid fire hazard and related expenses.

In respect to physical properties, the pyroxylin plastics are, in most qualities, either on a par with or superior to other plastics. They excel in toughness and are frequently used because they are not easily broken and can be bent, especially in thin sections, without breaking even when at room temperature or below. Tensile strength runs from about 7000 to 8000 lbs. per sq. in. As the density (specific gravity) varies from about 1.35 to about 1.50, corresponding to a weight of a little over 0.05 lb. per cu. in., the material is quite light. It transmits heat slowly, which makes it pleasant to the touch, is tasteless and substantially odorless. Water absorption is quite low (some figures put it at about 2 per cent in long immersion) and the

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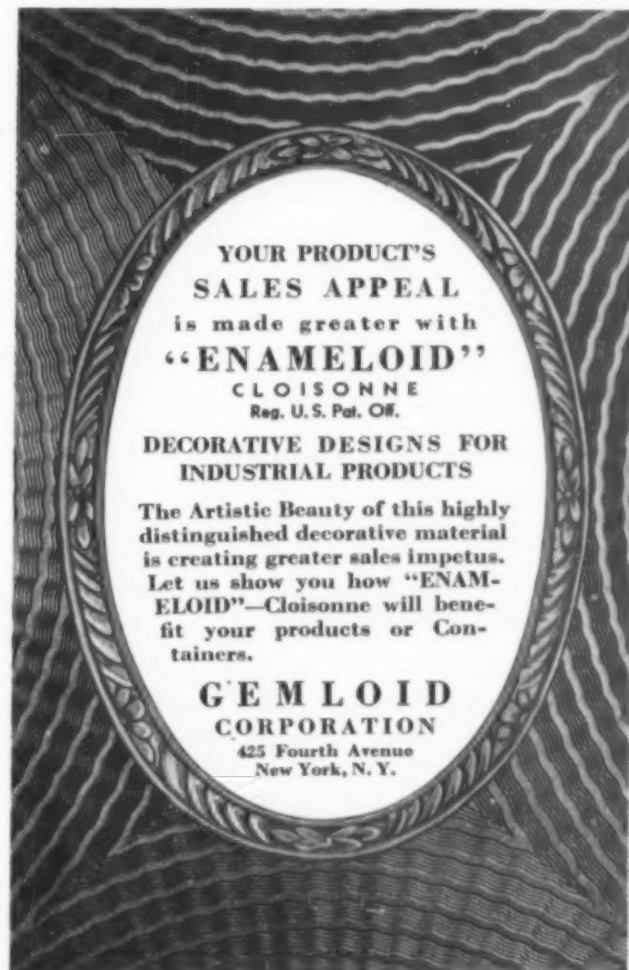
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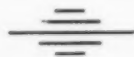
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The Artistic Beauty of this highly distinguished decorative material is creating greater sales impetus. Let us show you how "ENAMELOID"—Cloisonne will benefit your products or Containers.

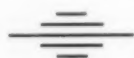
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FRIENDS AND CUSTOMERS
IN THE MOLDING INDUSTRY
DURING THE COMING YEAR



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of highest quality only—as supplied
by the country's leading makers.



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➔ Control color effects, designs, etc., on buttons, novelties, etc., on plastic material when molding same. Pat. No. 1,979,884. Write D. Sweeney, Sea View, Staten Island, New York.

Positions Wanted in Canada:

➔ FOREMAN, experience in manufacture of molded products (Bakelite-Urea-Tenite-Celluloid) familiar with methods to produce *Catalin* articles, skilled toolmaker, efficient in shop routine, accustomed to training help, desires position with progressive molding plant. Good references. Reply Box 103, Modern Plastics.

➔ TECHNICAL EXPERT, 15 years experience in Plastics Industry, conversant with all types of molding, *Phenol Resin & Thermo-plastic* materials, design and economical production methods, wishes contact with Company requiring such service. Reply Box 104, Modern Plastics.

➔ Which molding company is interesting in manufacturing *Celluloid Press Combs* in Canada. Expert advice and technical assistance regarding methods, equipment, tools, etc. Write Box 105, Modern Plastics.

material is a good electrical insulator, though it is seldom chosen as such because of its inflammability and possible ignition by arcing. Clear materials are highly transparent.

Although pyroxylin plastics are not much affected by water and can be washed without injury, continuous contact with water is not recommended. Salts and weak acids have little effect, but strong acids and alkalis cause decomposition. Alcohol, acetone and certain organic esters are solvents and are used in cementing. Softening begins at about 180 deg. F. and the material becomes more plastic as the temperature is raised, but heating up to 240 deg. F. produces no chemical change. Forming and molding is usually done at temperatures of 212 to 240 deg. F.

Sheets usually run about 20 x 50 in. and those 0.03 in. thick and under are usually sold by the sheet. Thicker

PHYSICAL PROPERTIES OF CELLULOSE NITRATE (PYROXYLIN) PLASTICS

(Note, the properties given vary to some extent with the type, form and make of material used. The values given show the approximate range of figures furnished by manufacturers.)

Tensile strength, lbs. per sq. in.	5,000 to 12,000
Impact strength, Izod, ft. lb.	0.25 to 11.5
Hardness, 2.5 mm. ball, 25 kg. load, $\frac{1}{200}$ mm. depth	45-65
Softening point, deg. F.	160-340
Breakdown voltage, volts per mil, 60 cycles	345-1180
Dielectric constant	6.7-9.2
Power factor, per cent, at 60 cycles	6.2-15.0
Specific gravity	1.35-1.97
Effect of water, cold	slight swelling
Effect of water, hot	swelled and softened
Effect of heat	Decomposes at temperatures of 100-150 deg. C.
Effect of light	Some discoloration and embrittlement
Molding qualities	Fair to excellent
Machining qualities	Good

Keytones and esters are solvents. Hydrocarbons, including mineral oils, and vegetable oils have no effect. Weak acids and alkalis have no effect, but strong acids and alkalis cause decomposition.

sheets, rod and tubes are sold by the pound. Some standard rods are made in $52\frac{1}{2}$ -in. lengths and can be had in diameters varying from $\frac{1}{16}$ in. to 2 in. Extruded tubes are sold, as a rule, in 60-in. or 30-in. lengths and inside diameters range from $\frac{1}{16}$ in. to 5 in. Small-diameter rod or "beading" is available in coils.

Much sheet stock is made up in laminated form, partly for decorative effect, and partly because the surface sheet or sheets, to be exposed prominently in the finished piece, are often a more expensive material than the core or backing which can be a much less expensive pyroxylin. This enables the use of brush backs, for example, with a pearl-like surface sheet and perhaps a clear amber backing.

Some stock for fountain pen barrels is made up in rod form and drilled out so as to give particular surface effects, but other tube is made either in extruded or

spiral form, especially for the pen and pencil barrels.

It is thus apparent that the pyroxylin plastics are extremely versatile materials and that their use may be expected to continue despite the competition which the development of newer plastics has brought about.

WHAT PLASTIC MOLDING INVOLVES

(Continued from page 14) well as means for heat treatment or hardening. Such equipment is expensive and requires expert handling, as well as a good knowledge of what the mold must do when put into use. The steel used in making molds is also expensive and rather hard to work. During heat treatment, dies occasionally crack and have to be rebuilt at considerable extra cost. For reasons such as these, molds are expensive and, since their cost must be absorbed in the product whether a separate charge is made or not, they have an important effect on the net cost of molded parts. Well made molds are suitable for the production of a hundred thousand or more parts, not, however, without some upkeep costs. Constantly subjected to extremely heavy pressures and varying degrees of heat, they require constant care and in some cases frequent adjustments.

Even when molds are exactly right and are properly set up ready for use, the molder's problems are far from being at an end. Each type of molded part presents its own set of problems and long experiments may be required before these are solved and production is under way at the desired rate. Such factors as variations in the molding compound, variations in temperature and pressure, changes in humidity, care in handling the mold and timing the molding cycle, proper measuring, tableting and preheating of the compound and many other items—some relating to the equipment and some to human elements that are bound to vary—add to the molder's worries and often to the expense which he cannot foresee and must usually absorb.

Not infrequently, when all problems appear to be solved and production is proceeding satisfactorily, some unforeseen variable arises and delays production without apparent reason. Despite tireless efforts of the makers of plastics to make successive batches of material exactly alike, some variation occurs. It may be a fault in storage or shipping conditions or any one of many human errors which cannot be eliminated with certainty. Even the expert "trouble shooters" whom plastic producers employ are sometimes "stumped" no matter how careful or competent they may be.

It will thus be seen that molding is not yet an exact science, but still an art in which much experience and patience must be exercised to produce desired results. Quite aside from this, the molding plant must keep its rather expensive equipment busy with the work that is available, as idle equipment or that which is not being used to good advantage does not pay its way. Only a few of the more successful plants have been able to keep their equipment in almost constant use, especially during the depression.



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